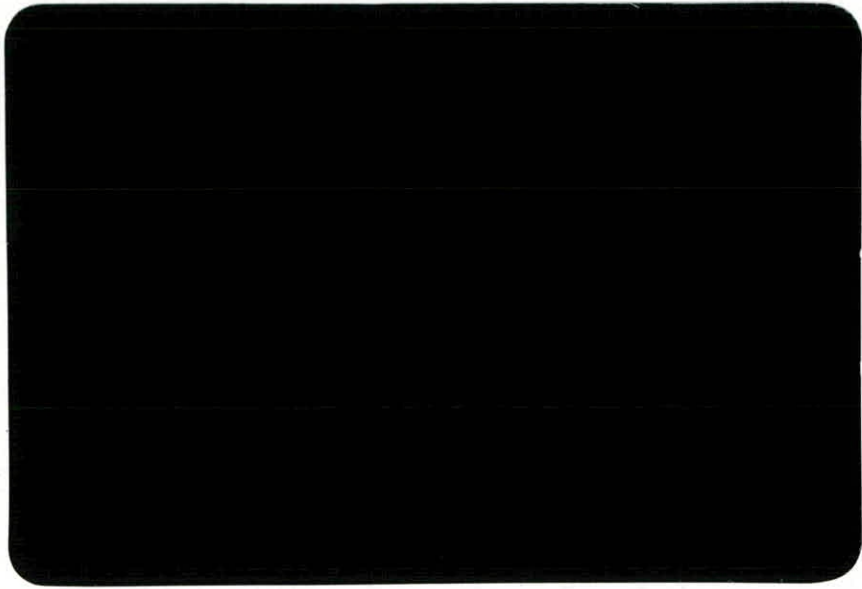


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An audit of performance in the analysis of biological samples in 1996

Environment Agency: Primary Audit

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Statement of Use

Information in this document is to help biologists in the Agency to identify where analytical errors occur so that they can be reduced or eliminated. Data in the tables provide measures of the accuracy of primary data produced in accordance with the standard methods for the River Invertebrate Prediction and Classification System (RIVPACS) and analysed to the level required for the Biological Monitoring Party (BMWP)-score system, including General Quality Assessment (GQA). Information in this report may be used to determine statistical confidence limits, and the statistical significances of differences between biological samples. This includes comparisons of Observed/Expected (O/E) values and quality bands made by the compare module of RIVPACS III+, and the statistical routine CONCLASS used for GQA surveys.

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1. INTRODUCTION

In 1996 the sampling of aquatic macro-invertebrates for the biological assessment of river quality was carried out throughout the United Kingdom. This task was undertaken by the Environment Agency (The Agency) in England and Wales, the Scottish Environment Protection Agency (SEPA) in Scotland and the Industrial Research and Technology Unit (IRTU) undertook the work in Northern Ireland.

Each organisation employed standard collection procedures as used in the 1995 General Quality Assessment (GQA) Survey. The sampling strategy was therefore compatible with RIVPACS (River InVertebrate Prediction And Classification System), a computer model developed by the Institute of Freshwater Ecology (IFE). Samples were sorted for the families of macro-invertebrates included in the Biological Monitoring Working Party (BMWP) system. Taxa present were recorded on site data sheets. Although attempts had been made to standardise sample processing and recording techniques, these did vary somewhat from Region to Region.

In view of the number of staff involved and the variability of sample processing techniques, it was recognised that a quality assurance exercise was necessary to minimise and quantify errors. Each laboratory appointed at least one experienced analyst to act as an internal analytical quality control (AQC) inspector. These inspectors re-sorted 10% of the laboratory's samples, those samples chosen for re-sorting being selected randomly. In addition, IFE was contracted to undertake an independent, external audit of the quality of the laboratory analysis of biological samples for each Agency and SEPA region and for IRTU. This commission was consistent with the audit performed by IFE for the National River Quality Surveys in 1990 and 1995 and for the routine biological monitoring of river sites each year between 1991 and 1994. The audit for the Agency comprised two elements. The AQC Audit provided a measure of the quality of performance of the AQC inspectors. The Primary Audit provided an independent assessment of the quality of the data, since this was not adjusted for errors identified by either of the other quality assurance procedures.

This report presents the results of the Primary Audit of 511 samples audited for the Agency. The results of the AQC Audit detailing the quality of the Agency's internal AQC inspections of 476 AQC'd samples, are reported separately (Gunn *et al.*, 1997).

2. SAMPLE SELECTION

Samples for audit were selected internally by each of the organisations being monitored. The method of selection used by the Agency is described in Environment Agency (1996). The number of samples selected for audit varied between laboratories and the biologists processing these samples had no prior knowledge of which samples were to be audited. Laboratories were instructed to send to IFE samples that had been processed twice (once for primary analysis and once for internal AQC inspection). Those which analysed an insufficient number of samples throughout the year to provide the requisite number of AQC-inspected samples for the audit sent as many AQC-inspected samples as they could and made up the number with samples which had been analysed just once. The manner of sample selection, which biologists would be monitored and the number of audit samples from each season, were left to the discretion of the organisation, within the limits of the total number of samples that IFE was contracted to audit.

3. SAMPLE PROCESSING

The normal protocol for Agency, SEPA and IRTU biologists was to sort their samples within the laboratory and to select examples of each scoring taxon within the BMWP system. The invertebrates were placed in a vial of preservative (4% formaldehyde solution or 70% industrial alcohol) and the BMWP taxa were listed on a data sheet. The vial of animals and the sorted material were then returned to the sample container and preservative added. Samples for internal AQC analysis should have been sorted in the same manner as the primary analysis. The AQC inspector's task included confirming the identification of the contents of the vial and the correctness of the data sheet. Any additional taxa found at AQC were to be placed in a separate vial without altering the contents of the primary analyst's vial, although this instruction was not always followed.

Each sample available to IFE for audit should have included:

- i) a data sheet containing a list of the BMWP families found in the sample.
- ii) a vial or vials containing representatives from each family.
- iii) the preserved sample.

When these three elements were present, the sequence of operations at IFE was as follows:

- a) The remainder of the sample was sorted, without reference to the data sheet or to the vials of animals, and the BMWP families identified.
- b) The families contained within the vials were identified.
- c) A comparison was made between the listing of families and those found in the sample by IFE.
- d) A comparison was made between the listing of families and those identified from the vials by IFE.
- e) "Losses" or "gains" from the original listing of families were noted. In the case of "gains", each additional family was identified, where possible, to species level, in order to clarify any specific repetitive errors. Single representatives of a "gained" taxon were noted as such.
- f) An error code, selected from a list on the result sheet, was assigned by the IFE auditor for each "loss" or "gain".

Occasionally a sample did not include a vial containing representative examples of the families listed on the data sheet, while some arrived with the vial damaged in transit such that the representative specimens were no longer separated. For these samples, only operations a), c), e) and f) above were appropriate.

Several directives were issued to IFE relating to the treatment of BMWP taxa. Every taxon recorded on the data sheet must be supported by a voucher specimen of that family in the vial (or, for very large specimens, left in the sample). The only exceptions to this rule were the native crayfish, *Austropotamobius pallipes*, the medicinal leech, *Hirudo medicinalis* and the pearl mussel, *Margaritifera margaritifera* (which does not belong to a BMWP family), all of which are protected species. Where possible, IFE gave the benefit of doubt to the analyst in cases of the "loss" of Planariidae, specimens of which have been known to disintegrate in preservative. Animals deemed to have been dead at the time of sampling, cast insect skins, pupal exuviae and empty mollusc shells were to be excluded from the listing of families present. Isolated posterior ends of "living"

specimens were not acceptable as records of a taxon. In these cases, thorax plus abdomen was deemed acceptable but abdomen only was deemed unacceptable. Terrestrial representatives of BMWP scoring families were also to be excluded from the audit. For this reason, Clambidae, Chrysomelidae and Curculionidae, which appear in the BMWP list, were excluded for the purposes of the audit since most representatives of these families are, at best, only semi-aquatic. Trichopteran pupae, although not routinely identified by many biologists, were to be included in the listing of families.

4. REPORTING

The results of each sample audit were recorded on a standard report form and sent to the appropriate Regional Biologist. Examples for Primary and AQC Audits of the same site are shown in Figures 1 & 2. IFE were instructed not to include copies of these forms in the report but that each region would keep their own forms as an appendix to this report. For audit samples where a vial of animals was included, the comparison between the listing of families and the taxa found in the vial by IFE was shown in the section of the report form headed "VIAL". Discrepancies could be due to carelessness, misidentifications or errors in completing the data sheet listing the families present. Families not on the listing but found by IFE in the remainder of the sample were entered in the section of the report form headed "SAMPLE" under "Additional BMWP taxa found by IFE". This section also included taxa added by the internal AQC analyst. Taxa recorded here represent families missed by the analyst(s) on sorting the sample. When the families listed as "losses" in the first section of the report form were compared with the full list of families recorded in the sample by IFE, some apparent losses from the vial were offset by the presence of those families in the remainder of the sample. These taxa were therefore listed both as "losses" from the vial and as "gains" from the sample and were neither a net loss nor a net gain. In these cases, the families were marked with an asterisk in both boxes. Such errors are noted as "omissions".

Species identifications, state of development (eg adult or larval coleopterans) and the presence of a single representative of a family within the remainder of the sample were recorded in the centre section of the report form under "species name".

IFE was asked to interpret each error to provide a possible cause. An error code, selected from a list of options at the foot of each result sheet, was entered against each taxon in the column headed "Presumed cause of error".

For those samples in which the vial of animals was damaged or missing, the "VIAL" sections of the report form were not applicable (N/a). Families not on the list but present in the sample were entered in the section under "SAMPLE" : "Additional taxa" as before. Families recorded on the list but not found by IFE were indicated in the section above this. If the vial of animals was retained by the sorter, entries in this box could include the sole representative of a family which was removed, a family seen at the site which escaped or was released (without mention being made on the data sheet), inaccurate identification or the wrong family box being ticked on the data sheet.

The final section of the result sheet summarises the audit, giving details of the numbers of "losses", "gains" and "omissions", together with the net effects on BMWP score and the number of scoring taxa.

Figure 1. An example of a Primary Audit result sheet

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Example	LABORATORY: Wareham	DATE: 1.3.96
WATER- COURSE: Beautiful River	PRIMARY ANALYST: XX	AQC ANALYST: YY
SITE: Utopia	CODE: 0001/AQC01	SORT/AQC METHOD: Preserved/Preserved

RESULTS OF PRIMARY AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found by IFE

Planorbidae	12
Terrestrial snail in vial	
Baetidae *	1
Limnephilidae	7

Additional BMWP taxa found by IFE

Lepidostomatidae	7
Lepidostoma hirtum (Fabricius)	

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Baetidae *	1
Baetis rhodani (Pictet)	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena gracilis Germar (a) 1 only	
Hydroptilidae	11
Hydroptila sp. (p) 1 only	
Psychomyiidae (incl. Ecnomidae)	11
Psychomyia pusilla (Fabricius)	

SUMMARY OF AUDIT

LOSSES 2

GAINS 4

OMISSIONS: 1

NET EFFECTS:

ON BMWP SCORE 19

ON NO. OF TAXA 2

- 1 No representative of family in vial
- 2 Alternative terrestrial specimen in vial
- 3 Posterior end only in vial
- 4 Empty shell or case or cast skin in vial

- 5 Specimen dead at time of sampling
- 6 Taxon in vial but not recorded
- 7 Mis-identification
- 8 Typographical error - wrong box ticked

- 9 Taxon missed in sorting
- 10 Unexplained error
- 11 Taxon added in internal AQC
- 12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

Figure 2. An example of an AQC Audit result sheet

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Example	LABORATORY: Wareham	DATE: 1.3.96
WATER- COURSE: Beautiful River	PRIMARY ANALYST: XX	AQC ANALYST: YY
SITE: Utopia	CODE: 0001/AQC01	SORT/AQC METHOD: Preserved/Preserved

RESULTS OF AQC AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found by IFE

Baetidae *	1
Limnephilidae	7

Additional BMWP taxa found by IFE

Lepidostomatidae	7
Lepidostoma hirtum (Fabricius)	

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Baetidae *	1
Bactis rhodani (Pictet)	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena gracilis Germar (a) 1 only	

SUMMARY OF AUDIT

LOSSES 1

GAINS 2

OMISSIONS: 1

NET EFFECTS:

ON BMWP SCORE 8

ON NO. OF TAXA 1

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

5. RESULTS

The results of the Primary Audit for all Agency regions are presented, Region by Region, in Tables 1 to 56. A summary of the basic audit results in terms of losses, gains and omissions is followed by the statistics of these regional audit results centered around the target of acceptability of no more than two missed taxa per sample. These data are presented for each analyst, for their area laboratories and for the Region as a whole. Then follows information on the net effects of the Primary Audit on the BMWP score and number of taxa for the Region's data. These results are again based on the target of no more than two missed taxa per sample. The figure of 13 for an acceptable underestimate of BMWP score is based on twice the average score of all taxa in the BMWP listing (excluding Clambidae, Chrysomelidae and Curculionidae, which are excluded from the audit). This average score is 6.57. Following this are listings for the Region of the taxa missed at family and species levels in the 1996 audit. Tables 57 and 58 summarise the statistics and effects of the Primary Audit for the whole of the Agency. Tables 59 and 60 give listings of all missed taxa at family and species levels for the whole of the Agency and Tables 61 and 62 give similar listings for all samples audited in 1996 for the whole of the UK (Primary and AQC Audits for Agency Regions plus single Audit for other organisations). Data for the AQC Audit is presented in a separate report (Gunn *et al.*, 1997).

Estimating sample biases for the compare module of RIVPACS III+

The underestimation of the number of BMWP-scoring taxa is termed bias for the purpose of the compare module of RIVPACS III+. An estimate of bias is provided by the net gains (number of gains minus number of losses). The average net gains for each laboratory, Region and the Agency as a whole are listed in Table 58 in the column "mean net effect on no. of taxa". These values may be used directly for RIVPACS. To estimate the bias over a different period to that covered by this audit, it is necessary to refer to the individual Primary Audit result sheets for individual samples. Note that estimates of bias should be based on the results of at least 20 audited samples. Further instructions are given in Clarke *et al.* (1997).

6. ACKNOWLEDGEMENTS

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AUDIT OF ANGLIAN REGION'S PRIMARY ANALYSTS

Table 1. The 20 samples audited for the Central Area of Anglian Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Pakenham Stream	Fulmer Bridge, Ixworth	LJS	0	0	1
Bury Brook	Road Culvert Bury	LJS	1	3	0
Old R. Nene	Pig Water Sluice, Yaxley	LJS	0	1	1
AUTUMN					
New River (Monks Lode)	100 Acre Farm Bridge	LJS	0	0	0
Cam	Green Dragon F/bridge, Chesterton	LJS	0	2	0
Ouzel	Billington	LJS	0	0	0
Nene (Old Course)	Andrews Farm, March	LJS	0	2	2
Lark	Hengrave Bridge	LJS	0	3	0
Forty Foot	Forty Foot Bridge, Ramsey	LJS	0	1	0
Old Course Nene	Pig Water Sluice, Yaxley	LJS	0	2	0
Stringsides Stream	White Bridge, Oxborough	LJS	0	2	0
Silverstone Brook	A413 Bridge	SEH	0	2	1
Millbridge Brook	B1040 Bridge, Pottton	SEH	0	2	0
Ouzel	A5 Old Bridge, Bletchley	SEH	0	2	0
Sharnbrook	Rushden Road Bridge, Sharnbrook	SEH	1	3	0
Cut Off Channel	Eriswell Hall Bridge	SEH	0	0	0
Lark	Tollgate Bridge	SEH	0	3	0
Ten Mile River	Brandon Creek	SEH	0	4	0
Nar	Mileham	WTC	0	3	0
Nar	West Lexham	WTC	0	7	1

Table 2. The 20 samples audited for the Eastern Area of Anglian Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
River Ter	Bumfords Bridge	EDT	0	2	0
R. Gipping	Station Road Bridge	EDT	0	2	0
R. Bure	Horning Ferry	EDT	1	4	0
Broome Beck	Longford Bridge	JMG	0	0	0
Laver Brook	Brook Hall	JMG	0	0	1
AUTUMN					
Stour	Boxted Mill	CSA	0	4	1
Yare	Bickerstone Bridge	CSA	0	2	0
Tud	Whitford Bridge	CSA	0	2	0
Waveney	Mendham Bridge	CSA	0	2	0
Witton Run	Bays Bridge	CSA	0	0	0
Tenpenny Brook	Footbridge East of Stable Wood	CSA	0	1	0
Holland Brook	Holland Main Road Bridge	CSA	0	0	0
Wenhaston Watercourse	Blackheath Bridge	DH	0	4	0
Lark	Gt Bealings Bridge	DH	0	1	0
Bumpstead Brook	Watsoe Bridge	JHS	0	2	0
Gipping	Quintons Mill	JMG	0	0	0
Roxwell Brook	u/s Newlands Brook	JMG	0	1	0
Chelmer	Langleys Bridge	JMG	0	1	0
Blackwater	Greys Mill	JMG	0	2	0
Leiston Beck	Lovers Lane Bridge	LKH	0	4	0

Table 3. The 20 samples audited for the Northern Area of Anglian Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
G.U.C.	Blisworth	RPC	0	3	0
Waithe Beck	Tetney	RPC	0	1	0
Waithe Beck	A1031	RPC	0	1	0
R. Welland	Crowland Bridge	SJH	0	2	0
Kyme Eau	South Kyme	SJH	0	1	0
AUTUMN					
Fossdyke Canal	Pywipe	CAE	0	5	0
Waithe Beck	A1031	CAE	0	4	0
Lower Witham	Langrick Bridge	CAE	0	2	0
Glen	Kates Bridge	DMB	0	0	0
Woldgrift Drain	Old Railway Bridge	DMB	0	2	0
Old Ancholme	Wrawby	DMB	0	2	0
Land Drain	Saxby Carrs	DMB	0	1	0
Welland	Deeping	RPC	0	4	0
Willow Brook South	A427	RPC	0	2	0
South Drove Drain	Laws Farm	RPC	0	1	0
Grove Farm Feeder Stream	Ashby St Ledgers Ford	RPC	0	2	0
Chater	North Luffenham	SJH	0	0	0
Horncastle Canal	Wharf Lane	SJH	0	2	1
Lacey Beck	Stud Farm	SJH	0	0	0
New Cut Drain	Pyewipe Pumping Station	SJH	0	0	0

Table 4. Statistics of the 1996 Primary Audit results for Anglian Region

Analyst/Group	n	Mean gains	Standard error	No.samples >2 gains	% samples >2 gains	Highest no. gains	Mean errors (1+g+o)	Standard error
Central	20	2.10	0.37	7	35.00	7	2.50	0.41
LJS	11	1.45	0.34	2	18.18	3	1.91	0.41
SEH	7	2.29	0.47	3	42.86	4	2.57	0.53
WTC	2	5.00	2.00	2	100.00	7	5.50	2.50
Eastern	20	1.70	0.32	4	20.00	4	1.85	0.35
CSA	7	1.57	0.53	1	14.29	4	1.71	0.64
DH	2	2.50	1.50	1	50.00	4	2.50	1.50
EDT	3	2.67	0.67	1	33.33	4	3.00	1.00
JHS	1	2.00	n/a	0	0.00	2	2.00	n/a
JMG	6	0.67	0.33	0	0.00	2	0.83	0.31
LKH	1	4.00	n/a	1	100.00	4	4.00	n/a
Northern	20	1.75	0.32	4	20.00	5	1.80	0.32
CAE	3	3.67	0.88	2	66.67	5	3.67	0.88
DMB	4	1.25	0.48	0	0.00	2	1.25	0.48
RPC	7	2.00	0.44	2	28.57	4	2.00	0.44
SJH	6	0.83	0.40	0	0.00	2	1.00	0.52
Anglian Region	60	1.85	0.19	15	25.00	7	2.05	0.21

Table 5. Net effects of the Primary Audit on BMWP score and number of scoring taxa for Anglian Region

Analyst/Group	n	Mean net effect on BMWP score	% of samples underestimated by score >13	Maximum underestimate of BMWP score	Mean net effect on no. of taxa	% of samples underestimated by >2 taxa	Maximum underestimate of no. of taxa
Central	20	11.35	30.00	46	2.00	25.00	7
LJS	11	7.55	18.18	15	1.36	9.09	3
SEH	7	11.57	28.57	21	2.14	28.57	4
WTC	2	31.50	100.00	46	5.00	100.00	7
Eastern	20	8.55	30.00	29	1.65	20.00	4
CSA	7	9.14	28.57	29	1.57	14.29	4
DH	2	10.00	50.00	15	2.50	50.00	4
EDT	3	13.00	66.67	17	2.33	33.33	3
JHS	1	11.00	0.00	11	2.00	0.00	2
JMG	6	3.33	0.00	9	0.67	0.00	2
LKH	1	17.00	100.00	17	4.00	100.00	4
Northern	20	8.15	15.00	26	1.75	20.00	5
CAE	3	17.33	66.67	26	3.67	66.67	5
DMB	4	4.50	0.00	9	1.25	0.00	2
RPC	7	9.57	14.29	21	2.00	28.57	4
SJH	6	4.33	0.00	13	0.83	0.00	2
Anglian Region	60	9.35	25.00	46	1.80	21.67	7

Table 6 The families missed by Anglian Region's primary analysts

Family	n	% of Anglian Region's missed taxa in Primary Audit
Elmidae	11	10.19
Hydroptilidae	9	8.33
Tipulidae	5	4.63
Lymnaeidae	5	4.63
Planariidae (incl. Dugesiidae)	4	3.70
Sphaeriidae	4	3.70
Simuliidae	4	3.70
Hydrobiidae (incl. Bithyniidae)	4	3.70
Valvatidae	4	3.70
Limnephilidae	4	3.70
Leptoceridae	3	2.78
Ancylidae (incl. Acroloxidae)	3	2.78
Glossiphoniidae	3	2.78
Coenagriidae	3	2.78
Baetidae	3	2.78
Hydropsychidae	3	2.78
Polycentropodidae	3	2.78
Hydrophilidae (incl. Hydraenidae)	3	2.78
Planorbidae	3	2.78
Asellidae	2	1.85
Corophiidae	2	1.85
Dendrocoelidae	2	1.85
Gyrinidae	2	1.85
Haliplidae	2	1.85
Physidae	2	1.85
Notonectidae	2	1.85
Molannidae	2	1.85
Erpobdellidae	1	0.93
Ephemeridae	1	0.93
Leptophlebiidae	1	0.93
Oligochaeta	1	0.93
Neritidae	1	0.93
Corixidae	1	0.93
Psychomyiidae (incl. Ecnomidae)	1	0.93
Chironomidae	1	0.93
Calopterygidae	1	0.93
Rhyacophilidae (incl. Glossosomatidae)	1	0.93
Ephemerellidae	1	0.93
TOTAL	108	100.00

Table 7 The species missed by Anglian Region's primary analysts

Species	n	% of Anglian Region's missed species in Primary Audit
Hydroptila sp.	6	5.26
Oulimnius sp.	6	5.26
Elmis aenea (Muller)	5	4.39
Potamopyrgus jenkinsi (Smith)	4	3.51
Valvata piscinalis (Muller)	3	2.63
Helobdella stagnalis (L.)	3	2.63
Ancylus fluviatilis Muller	3	2.63
Polycelis nigra/tenuis	3	2.63
Orectochilus villosus (Muller)	2	1.75
Ischnura elegans (Van der Linden)	2	1.75
Limnephilidae indet	2	1.75
Limnephilus sp.	2	1.75
Lymnaea peregra (Muller)	2	1.75
Lymnaea sp.	2	1.75
Haliphus sp.	2	1.75
Notonecta sp.	2	1.75
Tipula (Yamatotipula) montium group	2	1.75
Oxyethira sp.	2	1.75
Physa fontinalis (L.)	2	1.75
Pisidium sp.	2	1.75
Polycentropus flavomaculatus (Pictet)	2	1.75
Simulium (Eusimulium) aureum group	2	1.75
Valvata cristata Muller	2	1.75
Molanna angustata Curtis	2	1.75
Dendrocoelum lacteum (Muller)	2	1.75
Cloeon dipterum (L.)	2	1.75
Athripsodes aterrimus (Stephens)	2	1.75
Bathymphalus contortus (L.)	1	0.88
Pilaria (Pilaria) sp.	1	0.88
Pilaria sp.	1	0.88
Baetis vernus Curtis	1	0.88
Asellus meridianus Racovitza	1	0.88
Asellus aquaticus (L.)	1	0.88
Calopteryx splendens (Harris)	1	0.88
Simulium (Boophthora) erythrocephalum (de Geer)	1	0.88
Agraylea multipunctata Curtis	1	0.88
Anisus vortex (L.)	1	0.88
Simulium (Nevermannia) angustitarse group	1	0.88
Simulium (Simulium) ornatum group	1	0.88
Sphaeriidae indet	1	0.88
Sphaerium sp.	1	0.88
Theodoxus fluviatilis (L.)	1	0.88
Tinodes waeneri (L.)	1	0.88
Anacaena bipustulata (Marshall)	1	0.88
Agapetus sp.	1	0.88
Gyraulus albus (Muller)	1	0.88
Tubificidae	1	0.88
Sigara (Subsigara) falleni (Fieber)	1	0.88

Table 7 (continued)

Species	n	% of Anglian Region's missed species in Primary Audit
Hydropsyche siltalai Dohler	1	0.88
Oulimnius tuberculatus (Muller)	1	0.88
Erpobdella octoculata (L.)	1	0.88
Ephemerella ignita (Poda)	1	0.88
Hippeutis complanatus (L.)	1	0.88
Hydropsyche angustipennis (Curtis)	1	0.88
Hydropsyche sp.	1	0.88
Ephemera sp.	1	0.88
Dugesia tigrina (Girard)	1	0.88
Laccobius sp.	1	0.88
Leptophlebia marginata (L.)	1	0.88
Cercyon sp.	1	0.88
Limnephilidae	1	0.88
Coenagriidae indet	1	0.88
Oulimnius major (Rey)	1	0.88
Mystacides nigra/longicornis	1	0.88
Corophium curvispinum Sars	1	0.88
Lymnaea stagnalis (L.)	1	0.88
Corophium multisetosum Stock	1	0.88
Cyrtus flavidus McLachlan	1	0.88
Dicranota sp.	1	0.88
Orthocladinae	1	0.88
TOTAL	114	100.00

AUDIT OF MIDLANDS REGION'S PRIMARY ANALYSTS

Table 8. The 20 samples audited for the Upper Severn Area of Midland Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Stour	Maypole Hill	ADG	0	0	0
Tetchill Brook	Tetchill	ADG	1	1	0
Iwrrh	Pont Mad Mochnant	HB	0	8	2
Beanhill	Wrockwardine	LM	0	0	0
Mad Brook	Halesfield	LM	1	0	0
Black Brook	Pedimore	PW	0	1	0
Minsterley Brook	Malehurst	PW	0	3	0
Blore	A53 Bridge	PW	0	1	0
Spadesbourne Brook	The Strand	TPE	0	1	0
Teme	Knucklas	TPE	0	5	0
SUMMER					
Stour	Wilden	ADG	0	0	0
Tern	Shiffords Bridge	PW	0	4	0
AUTUMN					
Stour	Hayseech	ADG	0	1	0
Hoo Brook	u/s Kidderminster	HB	0	4	0
Tern	Waters Upton	HB	1	9	0
Quinny Brook	u/s Church Stretton STW	HB	0	0	0
Cain	Hafo Dinnas	HB	0	3	1
Salwarpe	Mildenhall Mill	PW	0	3	0
Albrighton Brook	A464	PW	0	2	1
Gallows Brook	u/s Hagley STW	PW	1	3	0

Table 9. The 20 samples audited for the Lower Severn Area of Midland Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Chelt	Withy Bridge	ADC	1	1	0
Badsey Brook	d/s Childswickham	ADC	0	1	0
Bow Brook	u/s Priest Bridge WRW	ADC	0	1	0
Radford Brook	A425 Bridge, Radford Semele	ADC	0	0	0
Avon	Hampton Lucy	ADC	0	4	0
Hatherley Brook	The Elms, Twigworth	HJW	0	4	0
Cinderford Brook	Lower Soudley	HJW	0	3	0
Gog Brook	Stratford Road	HJW	2	2	0
Carrant Brook	Tewkesbury	HJW	0	4	0
Leadon	Ross Road Bridge	HJW	0	2	0
AUTUMN					
Washbourne Brook	Little Washbourne	ADC	0	1	0
Leam	u/s Braunston STW	ADC	0	1	0
Sherbourne	Spon End	ADC	0	0	0
Smite Brook	d/s Monks Kirby STW	ADC	0	1	0
Withy Brook	High Bridge	ADC	0	2	0
Severn	Hawbridge	HJW	0	1	0
Leadon	Elm Bridge	HJW	0	1	0
Coaley Brook	Cam confluence	HJW	0	2	0
Badsey Brook	Offenham	HJW	0	0	0
Cannop Brook	Lydney Harbour	PCG	0	1	0

Table 10. The 20 samples audited for the Upper Trent Area of Midland Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Gayton Brook	Weston	CAS	0	1	1
Carlton Brook	Carlton	CAS	0	2	0
Gilwiskaw Brook	d/s Northern Dairies	CAS	0	0	0
Harlaston Brook	Harlaston	CAS	0	3	0
Hilton Brook	Hilton	GF	0	1	1
Marston Brook	Brocksford	RM	0	2	0
Rolleston Brook	d/s WRW	RM	0	4	0
SUMMER					
Rea	Kitchener Road	GF	0	1	0
Brindley Brook	u/s Mine	GF	0	2	0
Snibston Brook	Confluence	LTT	0	3	0
Dog Lane Brook	Heart of England Way	LTT	0	2	1
AUTUMN					
Blythe	Packington Ford	CAS	0	3	0
Bramborough Brook	d/s Donisthorpe	CAS	0	5	0
Doxey Brook	Doxey	CAS	0	2	0
Penk	Cuttlestone Bridge	CAS	0	3	0
Ditch/Blithe Tributary	u/s Railway, u/s pollution	GF	0	5	1
Teaen	Brookhouses	GF	0	0	0
Manifold	Hulme End	GF	0	5	1
Scotch Brook	Stone	LTT	0	1	0
Brindley Brook	u/s Mine discharge	LTT	0	4	0

Table 11. The 20 samples audited for the Lower Trent Area of Midland Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Westmeadow Brook	Long Whatton	LB	1	4	0
Wye	Millers Dale	PH	0	1	0
Twyford Brook	d/s Findern WRW	PS	0	1	0
Willoughton Brook	Willoughton	PS	0	1	0
Noe	u/s Edale WRW	PS	0	1	0
Alfreton Brook	Ford Bridge Lane	PS	0	0	0
SUMMER					
Greet	Kirklington	AR	1	4	2
Grimmer	Granby	BF	0	2	0
Stanley Brook	u/s Midlands Storage	BF	0	3	0
Soar	Birstall	PH	0	2	0
Catchwater Drain	South Leverton	PH	0	3	0
Rothley Brook	Thornton	PS	0	1	0
AUTUMN					
Maun	Edwinstowe	AR	0	3	2
Heage Brook	Ambergate	AR	1	5	0
Carr Dyke	Trent confluence	AR	0	5	0
Devon	Wensor Bridge	AR	0	2	0
Broughton Astley Brook	Croft	PH	0	2	0
Bottesford Brook	Brigg Road	PS	0	1	0
Torne	Goole Bridge, Tickhill	PS	0	4	1
Peakshole Water	Hope	PS	0	1	0

Table 12. Statistics of the 1996 Primary Audit results for Midland Region

Analyst/Group	n	Mean gains	Standard error	No.samples >2 gains	% samples >2 gains	Highest no. gains	Mean errors (l+g+o)	Standard error
Upper Severn	20	2.45	0.58	9	45.00	9	2.85	0.65
ADG	4	0.50	0.29	0	0.00	1	0.75	0.48
HB	5	4.80	1.66	4	80.00	9	5.60	1.94
LM	2	0.00	0.00	0	0.00	0	0.50	0.50
PW	7	2.43	0.43	4	57.14	4	2.71	0.47
TPE	2	3.00	2.00	1	50.00	5	3.00	2.00
Lower Severn	20	1.60	0.28	4	20.00	4	1.75	0.31
ADC	10	1.20	0.36	1	10.00	4	1.30	0.37
HJW	9	2.11	0.45	3	33.33	4	2.33	0.50
PCG	1	1.00	n/a	0	0.00	1	1.00	n/a
Upper Trent	20	2.45	0.35	9	45.00	5	2.70	0.38
CAS	8	2.38	0.53	4	50.00	5	2.50	0.50
GF	6	2.33	0.88	2	33.33	5	2.83	1.05
LTT	4	2.50	0.65	2	50.00	4	2.75	0.63
RM	2	3.00	1.00	1	50.00	4	3.00	1.00
Lower Trent	20	2.30	0.33	8	40.00	5	2.70	0.46
AR	5	3.80	0.58	4	80.00	5	5.00	0.84
BF	2	2.50	0.50	1	50.00	3	2.50	0.50
LB	1	4.00	n/a	1	100.00	4	5.00	n/a
PH	4	2.00	0.41	1	25.00	3	2.00	0.41
PS	8	1.25	0.41	1	12.50	4	1.38	0.53
Midlands Region	80	2.20	0.20	30	37.50	9	2.50	0.23

Table 13. Net effects of the Primary Audit on BMWP score and number of scoring taxa for Midland Region

Analyst/Group	n	Mean net effect on BMWP score	% of samples underestimated by score >13	Maximum underestimate of BMWP score	Mean net effect on no. of taxa	% of samples underestimated by >2 taxa	Maximum underestimate of no. of taxa
Upper Severn	20	12.70	35.00	46	2.25	40.00	8
ADG	4	1.25	0.00	5	0.25	0.00	1
HB	5	27.00	80.00	46	4.60	80.00	8
LM	2	-2.50	0.00	0	-0.50	0.00	0
PW	7	10.57	28.57	22	2.29	42.86	4
TPE	2	22.50	50.00	38	3.00	50.00	5
Lower Severn	20	8.50	25.00	22	1.45	20.00	4
ADC	10	5.60	10.00	15	1.10	10.00	4
HJW	9	11.56	44.44	22	1.89	33.33	4
PCG	1	10.00	0.00	10	1.00	0.00	1
Upper Trent	20	13.60	30.00	37	2.45	45.00	5
CAS	8	12.25	12.50	32	2.38	50.00	5
GF	6	13.67	33.33	37	2.33	33.33	5
LTT	4	14.00	25.00	24	2.50	50.00	4
RM	2	18.00	100.00	21	3.00	50.00	4
Lower Trent	20	11.60	45.00	28	2.15	40.00	5
AR	5	18.20	80.00	28	3.40	80.00	5
BF	2	16.50	50.00	22	2.50	50.00	3
LB	1	14.00	100.00	14	3.00	100.00	3
PH	4	11.25	50.00	16	2.00	25.00	3
PS	8	6.13	12.50	18	1.25	12.50	4
Midlands Region	80	11.60	33.75	46	2.08	36.25	8

Table 14 The families missed by Midland Region's primary analysts

Family	n	% of Midlands Region's missed taxa in Primary Audit
Elmidae	13	7.74
Simuliidae	9	5.36
Halplidae	7	4.17
Planorbidae	7	4.17
Hydrobiidae (incl. Bithyniidae)	7	4.17
Ancylidae (incl. Acroloxidae)	6	3.57
Tipulidae	6	3.57
Caenidae	5	2.98
Heptageniidae	4	2.38
Hydroptilidae	4	2.38
Hydrophilidae (incl. Hydraenidae)	4	2.38
Psychomyiidae (incl. Ecnomidae)	4	2.38
Leptoceridae	4	2.38
Limnephilidae	4	2.38
Lymnaeidae	4	2.38
Oligochaeta	4	2.38
Planariidae (incl. Dugesiidae)	4	2.38
Physidae	4	2.38
Goeridae	4	2.38
Chironomidae	4	2.38
Asellidae	4	2.38
Gyrinidae	3	1.79
Erpobdellidae	3	1.79
Lepidostomatidae	3	1.79
Scirtidae	3	1.79
Rhyacophilidae (incl. Glossosomatidae)	3	1.79
Polycentropodidae	3	1.79
Nemouridae	3	1.79
Sphaeriidae	3	1.79
Corixidae	2	1.19
Calopterygidae	2	1.19
Sialidae	2	1.19
Baetidae	2	1.19
Coenagriidae	2	1.19
Valvatidae	2	1.19
Dytiscidae (incl. Noteridae)	2	1.19
Ephemerellidae	2	1.19
Leuctridae	2	1.19
Leptophlebiidae	2	1.19
Ephemeridae	2	1.19
Hydropsychidae	2	1.19
Piscicolidae	2	1.19
Taeniopterygidae	1	0.60
Unionidae	1	0.60
Chloroperlidae	1	0.60
Gammaridae (incl. Crangonyctidae)	1	0.60
Perlodidae	1	0.60
Glossiphoniidae	1	0.60
TOTAL	168	100.00

Table 15 The species missed by Midland Region's primary analysts

Species	n	% of Midlands Region's missed species in Primary Audit
<i>Elmis aenea</i> (Muller)	9	5.03
<i>Potamopyrgus jenkinsi</i> (Smith)	7	3.91
<i>Simulium</i> (<i>Simulium</i>) <i>ornatum</i> group	6	3.35
<i>Ancylus fluviatilis</i> Muller	5	2.79
<i>Asellus aquaticus</i> (L.)	4	2.23
<i>Caenis luctuosa/macrura</i>	4	2.23
Orthocladiinae	4	2.23
<i>Haliphus</i> sp.	4	2.23
<i>Lymnaea peregra</i> (Muller)	4	2.23
<i>Orectochilus villosus</i> (Muller)	3	1.68
<i>Hydroptila</i> sp.	3	1.68
<i>Gyraulus albus</i> (Muller)	3	1.68
<i>Oulimnius</i> sp.	3	1.68
<i>Limnius volckmari</i> (Panzer)	3	1.68
<i>Tinodes waeneri</i> (L.)	3	1.68
<i>Elodes</i> sp.	3	1.68
<i>Physa acuta/heterostropha</i>	3	1.68
<i>Pisidium</i> sp.	3	1.68
Tubificidae	3	1.68
<i>Habrophlebia fusca</i> (Curtis)	2	1.12
<i>Hydropsyche siltalai</i> Dohler	2	1.12
<i>Polycelis felina</i> (Dalyell)	2	1.12
<i>Polycelis nigra/tenuis</i>	2	1.12
<i>Ischnura elegans</i> (Van der Linden)	2	1.12
<i>Erpobdella octoculata</i> (L.)	2	1.12
<i>Ephemerella ignita</i> (Poda)	2	1.12
<i>Piscicola geometra</i> (L.)	2	1.12
Lumbriculidae	2	1.12
<i>Lepidostoma hirtum</i> (Fabricius)	2	1.12
<i>Simulium</i> (<i>Eusimulium</i>) <i>aureum</i> group	2	1.12
<i>Ephemera</i> sp.	2	1.12
<i>Silo</i> sp.	2	1.12
<i>Sigara</i> (<i>Sigara</i>) <i>dorsalis</i> (Leach)	2	1.12
<i>Nemurella picteti</i> Klapalek	2	1.12
Chironomini	2	1.12
<i>Dicranota</i> sp.	2	1.12
<i>Ecdyonurus</i> sp.	2	1.12
<i>Armiger crista</i> (L.)	2	1.12
<i>Oxyethira</i> sp.	1	0.56
<i>Nemoura avicularis</i> Morton	1	0.56
<i>Mystacides azurea</i> (L.)	1	0.56
<i>Lype</i> sp.	1	0.56
<i>Physa fontinalis</i> (L.)	1	0.56
<i>Pilaria</i> (<i>Neolimnomyia</i>) sp.	1	0.56
Tanytarsini	1	0.56
<i>Rhyacophila dorsalis</i> (Curtis)	1	0.56
<i>Valvata piscinalis</i> (Muller)	1	0.56
<i>Valvata cristata</i> Muller	1	0.56
Tanypodinae	1	0.56
<i>Simulium</i> (<i>Simulium</i>) <i>reptans</i> (L.)	1	0.56
<i>Simulium</i> (<i>Boopthora</i>) <i>erythrocephalum</i> (deGeer)	1	0.56

Table 15 (continued)

Species	n	% of Midlands Region's missed species in Primary Audit
Simulium (Wilhelmia) sp.	1	0.56
Sialis fuliginosa Pictet	1	0.56
Pilaria (Pilaria) sp.	1	0.56
Rhithrogena sp.	1	0.56
Prodiamesinae	1	0.56
Polycentropus flavomaculatus (Pictet)	1	0.56
Plectrocnemia sp.	1	0.56
Plectrocnemia conspersa (Curtis)	1	0.56
Platambus maculatus (L.)	1	0.56
Planorbidae indet	1	0.56
Sialis lutaria (L.)	1	0.56
Baetis scambus group	1	0.56
Erpobdellidae indet	1	0.56
Drusus annulatus (Stephens)	1	0.56
Crunoecia irrorata (Curtis)	1	0.56
Chloroperla torrentium (Pictet)	1	0.56
Calopteryx splendens (Harris)	1	0.56
Calopteryx sp.	1	0.56
Gammarus pulex (L.)	1	0.56
Brachyptera risi (Morton)	1	0.56
Athripsodes bilineatus (L.)	1	0.56
Baetis rhodani (Pictet)	1	0.56
Austrolimnophila sp.	1	0.56
Athripsodes cinereus (Curtis)	1	0.56
Athripsodes aterrimus (Stephens)	1	0.56
Anisus vortex (L.)	1	0.56
Anacaena globulus (Paykull)	1	0.56
Agapetus sp.	1	0.56
Limnophila (Eloeophila) sp.	1	0.56
Leuctra inermis Kempny	1	0.56
Caenis rivulorum Eaton	1	0.56
Leuctra fusca (L.)	1	0.56
Limnephilus sp.	1	0.56
Anodonta sp.	1	0.56
Glossiphonia complanata (L.)	1	0.56
Limnephilidae indet	1	0.56
Acroloxus lacustris (L.)	1	0.56
Isoperla grammatica (Poda)	1	0.56
Ilybius sp.	1	0.56
Hydraena riparia	1	0.56
Hydraena gracilis Germar	1	0.56
Haliplidae indet	1	0.56
Heptagenia sulphurea (Muller)	1	0.56
Goera pilosa (Fabricius)	1	0.56
Halesus digitatus/radiatus	1	0.56
Goeridae indet	1	0.56
Glossosoma sp.	1	0.56
Haliplus fluviatilis Aube	1	0.56
Haliplus lineatocollis (Marshall)	1	0.56
Helophorus flavipes/obscurus	1	0.56
Heptagenia lateralis (Curtis)	1	0.56
TOTAL	179	100.00

AUDIT OF NORTH EAST REGION'S PRIMARY ANALYSTS

Table 16. The 20 samples audited for the Dales Area of North East Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Skelton Beck	Tockett's Bridge	AG	0	0	0
Ure	Wensley	EA	0	2	0
Skerne	John Street	EA	0	0	0
Nidd	Holme Bottom	JC	0	0	0
Burn	Gollinglith Foot	JC	1	2	0
Cover	Middleham	JC	0	1	0
Hebden Beck	u/s Hebden Bridge	JC	0	2	0
Derwent	Forge Valley	JC	0	2	0
Derwent	Low Hutton	SW	0	5	0
SUMMER					
Swale	Skipton-on-Swale	JC	0	0	0
Tees	Holwick Head	JC	0	6	0
Ure	Wensley	SW	0	1	0
AUTUMN					
Esk	Lealholm	AG	0	5	0
Burn	Gollinglith Foot	AG	0	2	1
Balder	Cotherstone	AG	1	2	0
Wharfe	Ilkley	GJB	0	1	0
Wharfe	Boston Spa	GJB	0	3	0
Wharfe	Burnsall	JC	0	1	0
Costa Beck	Kirby Misperton	JR	1	3	1
Pickering Beck	Pickering	JR	0	4	0

Table 17. The 20 samples audited for the Northumbria Area of North East Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
North Tyne	Kielder viaduct	VW	0	1	0
Elsdon Burn	Soppit	VW	0	2	0
SUMMER					
Stagshaw Burn	Halton 1	GH	0	1	0
Gaunless	Butterknowle	JH	0	0	0
Gaunless	Evenwood	JH	0	0	0
AUTUMN					
Blyth	Bedlington	EC	0	0	0
Aln	Hawkhill	EC	0	3	0
Hindon Beck	Woolly Hill 1	GH	0	0	0
Stagshaw Burn	Halton 3	GH	0	1	0
Lumley Park Burn	Lumley Castle	JH	0	0	0
Valley Burn	Tudhoe Mill	JH	0	0	0
Gaunless	u/s R. Wear confluence	JH	0	1	0
Seaton Burn	6 u/s	PL	1	0	1
Seaton Burn	Fordley Estate	PL	0	0	0
Seaton Burn	Holywell Dean	PL	0	0	0
Seaton Burn	Melrose Ave	PL	0	0	0
Stanley Burn	d/s Memorial Park	SC	2	2	0
Tipalt Burn	d/s Wrytrees	VW	0	2	0
Devils Water	Dilston	VW	0	2	0
Nent	Alston	VW	0	0	0

Table 18. The 20 samples audited for the Ridings Area of North East Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Otterburn Beck	d/s Bell Busk STW - Trout Farm	FC	0	1	0
Worth	Providence Lane	FC	0	3	1
Greaseborough Dike	B6089	LBS	0	0	0
Calder	Wakefield	LBS	0	0	0
Aire	Saltaire	VE	0	1	0
Sheaf	Queens Road	VE	0	0	1
Aire	Bellbusk Road	VE	0	3	0
Calder	Mirfield	VE	0	0	0
SUMMER					
Cudworth Dike	u/s CSO	FC	0	2	0
Ryburn	u/s Booth Dean Clough	LBS	0	0	0
AUTUMN					
Turvin Clough	u/s Elphin Brook	FC	0	1	1
Hebden Water	Hebden Bridge	FC	0	1	0
Hipper	Haddon Close	LBS	0	1	0
Cubley Brook	Gledhill Avenue	LBS	0	0	0
Porter Brook	u/s Forge Dam (d/s Ochre limit)	LFM	0	0	0
Kearsley Brook	u/s Don confluence	LFM	0	3	1
Shepley Dike	Brook Bridge (u/s Ochre limit)	LFM	0	3	0
Leeshaw Beck	Further d/s Leeshaw Reservoir	VE	3	3	0
Thurnscoe Dike	u/s Derry Grove Dike	VE	0	2	0
Carr Dike	u/s Billingley Bridge	VE	1	2	0

Table 19. Statistics of the 1996 Primary Audit results for North East Region

Analyst/Group	n	Mean gains	Standard error	No.samples >2 gains	% samples >2 gains	Highest no. gains	Mean errors (l+g+o)	Standard error
Dales	20	2.10	0.40	6	30.00	6	2.35	0.42
AG	4	2.25	1.03	1	25.00	5	2.75	1.03
EA	2	1.00	1.00	0	0.00	2	1.00	1.00
GJB	2	2.00	1.00	1	50.00	3	2.00	1.00
JC	8	1.75	0.67	1	12.50	6	1.88	0.69
JR	2	3.50	0.50	2	100.00	4	4.50	0.50
SW	2	3.00	2.00	1	50.00	5	3.00	2.00
Northumbria	20	0.75	0.22	1	5.00	3	0.95	0.27
EC	2	1.50	1.50	1	50.00	3	1.50	1.50
GH	3	0.67	0.33	0	0.00	1	0.67	0.33
JH	5	0.20	0.20	0	0.00	1	0.20	0.20
PL	4	0.00	0.00	0	0.00	0	0.50	0.50
SC	1	2.00	n/a	0	0.00	2	4.00	n/a
VW	5	1.40	0.40	0	0.00	2	1.40	0.40
Ridings	20	1.30	0.27	5	25.00	3	1.70	0.38
FC	5	1.60	0.40	1	20.00	3	2.00	0.55
LBS	5	0.20	0.20	0	0.00	1	0.20	0.20
LFM	3	2.00	1.00	2	66.67	3	2.33	1.20
VE	7	1.57	0.48	2	28.57	3	2.29	0.75
North East Region	60	1.38	0.19	12	20.00	6	1.67	0.22

Table 20. Net effects of the Primary Audit on BMWP score and number of scoring taxa for North East Region

Analyst/Group	n	Mean net effect on BMWP score	% of samples underestimated by score >13	Maximum underestimate of BMWP score	Mean net effect on no. of taxa	% of samples underestimated by >2 taxa	Maximum underestimate of no. of taxa
Dales	20	14.35	40.00	44	2.00	25.00	6
AG	4	15.50	25.00	42	2.00	25.00	5
EA	2	10.50	50.00	16	1.50	0.00	2
GJB	2	16.50	50.00	23	2.00	50.00	3
JC	8	12.50	37.50	44	1.63	12.50	6
JR	2	20.50	50.00	30	3.00	50.00	4
SW	2	15.00	50.00	24	3.00	50.00	5
Northumbria	20	5.20	20.00	21	0.60	5.00	3
EC	2	10.50	50.00	21	1.50	50.00	3
GH	3	5.00	0.00	10	0.67	0.00	1
JH	5	1.00	0.00	5	0.20	0.00	1
PL	4	-1.25	0.00	0	-0.25	0.00	0
SC	1	6.00	0.00	6	0.00	0.00	0
VW	5	12.40	60.00	20	1.40	0.00	2
Ridings	20	5.55	10.00	23	1.10	20.00	3
FC	5	10.00	20.00	23	1.60	20.00	3
LBS	5	2.00	0.00	10	0.20	0.00	1
LFM	3	9.00	33.33	14	2.00	66.67	3
VE	7	3.43	0.00	13	1.00	14.29	3
North East Region	60	8.37	23.33	44	1.23	16.67	6

Table 21 The families missed by North East Region's primary analysts

Family	n	% of North East Region's missed taxa in Primary Audit
Hydroptilidae	4	4.94
Goeridae	4	4.94
Nemouridae	4	4.94
Ancylidae (incl. Acroloxidae)	4	4.94
Asellidae	4	4.94
Psychomyiidae (incl. Ecnomidae)	3	3.70
Taeniopterygidae	3	3.70
Caenidae	3	3.70
Limnephilidae	3	3.70
Chloroperlidae	3	3.70
Elmidae	3	3.70
Leptoceridae	3	3.70
Hydrophilidae (incl. Hydraenidae)	3	3.70
Physidae	2	2.47
Leptophlebiidae	2	2.47
Planariidae (incl. Dugesiidae)	2	2.47
Hydropsychidae	2	2.47
Polycentropodidae	2	2.47
Halplidae	2	2.47
Sphaeriidae	2	2.47
Tipulidae	1	1.23
Perlodidae	1	1.23
Ephemerellidae	1	1.23
Scirtidae	1	1.23
Unionidae	1	1.23
Sericostomatidae	1	1.23
Simuliidae	1	1.23
Valvatidae	1	1.23
Rhyacophilidae (incl. Glossosomatidae)	1	1.23
Beraeidae	1	1.23
Glossiphoniidae	1	1.23
Baetidae	1	1.23
Odontoceridae	1	1.23
Brachycentridae	1	1.23
Chironomidae	1	1.23
Coenagriidae	1	1.23
Erpobdellidae	1	1.23
Heptageniidae	1	1.23
Hirudinidae	1	1.23
Hydrobiidae (incl. Bithyniidae)	1	1.23
Lepidostomatidae	1	1.23
Leuctridae	1	1.23
Dendrocoelidae	1	1.23
TOTAL	81	100.00

Table 22 The species missed by North East Region's primary analysts

Species	n	% of North East Region's missed species in Primary Audit
Ancylus fluviatilis Muller	4	4.60
Silo pallipes (Fabricius)	4	4.60
Asellus aquaticus (L.)	4	4.60
Ithytrichia sp.	3	3.45
Hydraena gracilis Germar	3	3.45
Mystacides azurea (L.)	3	3.45
Chloroperla torrentium (Pictet)	3	3.45
Polycelis felina (Dalyell)	2	2.30
Hydroptila sp.	2	2.30
Haliphus sp.	2	2.30
Protonemura meyeri (Pictet)	2	2.30
Elmis aenea (Muller)	2	2.30
Taeniopteryx nebulosa (L.)	2	2.30
Caenis rivulorum Eaton	2	2.30
Tinodes waeneri (L.)	2	2.30
Nemoura avicularis Morton	1	1.15
Nemoura sp.	1	1.15
Odontocerum albicorne (Scopoli)	1	1.15
Orthocladiinae	1	1.15
Paraleptophlebia submarginata (Stephens)	1	1.15
Physa fontinalis (L.)	1	1.15
Physa sp.	1	1.15
Polycentropus flavomaculatus (Pictet)	1	1.15
Pisidium sp.	1	1.15
Rhyacophila sp.	1	1.15
Plectrocnemia sp.	1	1.15
Sphaeriidae indet	1	1.15
Trocheta sp.	1	1.15
Simulium (Simulium) ornatum group	1	1.15
Valvata cristata Muller	1	1.15
Potamopyrgus jenkinsi (Smith)	1	1.15
Sericostoma personatum (Spence)	1	1.15
Protonemura sp.	1	1.15
Pseudanodonta complanata (Rossmassler)	1	1.15
Psychomyia pusilla (Fabricius)	1	1.15
Pilaria (Pilaria) sp.	1	1.15
Ecdyonurus sp.	1	1.15
Caenis luctuosa/macrura	1	1.15
Athripsodes bilineatus (L.)	1	1.15
Baetis rhodani (Pictet)	1	1.15
Beraea maurus (Curtis)	1	1.15
Brachycentrus subnubilus Curtis	1	1.15
Brachyptera risi (Morton)	1	1.15
Caenis horaria (L.)	1	1.15
Dendrocoelum lacteum (Muller)	1	1.15
Limnius volckmari (Panzer)	1	1.15
Drusus annulatus/Ecclisopteryx guttulata	1	1.15
Agraylea multipunctata Curtis	1	1.15
Elodes sp.	1	1.15

Table 22 (continued)

Species	n	% of North East Region's missed species in Primary Audit
Ephemerella ignita (Poda)	1	1.15
Glossiphoniidae indet	1	1.15
Haemopsis sanguisuga (L.)	1	1.15
Hydropsyche siltalai Dohler	1	1.15
Hydropsyche sp.	1	1.15
Ischnura elegans (Van der Linden)	1	1.15
Isoperla grammatica (Poda)	1	1.15
Lepidostoma hirtum (Fabricius)	1	1.15
Leptophlebiidae indet	1	1.15
Leuctra inermis Kempny	1	1.15
Limnephilidae indet	1	1.15
Limnephilus extricatus Mclachlan	1	1.15
Dicranota sp.	1	1.15
TOTAL	87	100.00

AUDIT OF NORTH WEST REGION'S PRIMARY ANALYSTS

Table 23. The 13 samples audited for the Central Area of North West Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Sparting Brook	Barton Old Farm	ADE	0	1	0
Woodplumpton Brook	ptc Barton Brook	ADE	1	1	0
Norden Brook	ptc R.Hyndburn	AM	0	1	0
Hyndburn	ptc Hyndburn Brook	AM	0	1	0
Barley Water	ptc Pendle Water	EIG	0	2	0
Roddlesworth	d/s Star Mill	FD	1	2	1
Main Dyke	Preese Hall	KC	2	3	0
Sparting Brook	Barton Old Farm	KC	0	4	0
Hyndburn	ptc Hyndburn Brook	SLP	0	0	0
AUTUMN					
Hindburn	ptc R.Wenning	EIG	1	4	0
Alt	Railway Bridge, Formby	JAW	1	0	0
Cam Beck	ptc Gayle Beck	JAW	0	4	0
Longton Brook	ptc R.Douglas	KC	0	1	0

Table 24. The 20 samples audited for the Northern Area of North West Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Lostrigg Beck	Bridgefoot	AJ	1	2	0
Brathay	Clappersgate	BJI	0	7	1
Brunstock Beck	ptc R.Eden	DS	0	4	1
Cumwhitton Beck	NY 500 528	DS	1	3	0
Crooks Beck	ptc Lowgill Beck	DS	0	3	0
Kinmont Beck	Near Bootle	NC	0	0	0
Calder	Near Sellafield	NC	0	1	0
Winster	Bowland Bridge	NC	1	2	0
SUMMER					
Summerground Gill	NY 442 309	AJ	0	3	0
Esk	Longtown Bridge	DS	0	5	0
Eamont	A66 Bridge	DS	0	8	0
Ellergill Beck	NX 9955 0768	NC	0	1	0
AUTUMN					
Pow Beck	NY 247 237	AJ	0	2	1
Eamont	Pooley Bridge	DS	1	4	0
Dacre Beck	NY 478 267	DS	0	5	0
Bleng	us/ Mill Race outlet	HFH	1	1	0
Silecroft Beck	ptc Whicham Beck	HFH	0	0	0
Yewdale Beck	ptc Yew Tree Beck	HFH	0	1	1
Colton Beck	Colton Beck Bridge	HFH	1	1	0
Torver Beck	ptc Coniston Water	HFH	2	0	0

Table 25 The 20 samples audited for the Southern Area of North West Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Shelf Brook	u/s Super Alloys	AG	0	6	0
Gowy	Gowy Bridge	AG	0	1	0
Croco	Sproston Hall	JEB	0	4	0
Guy Lane Brook	ptc R.Gowy	JEB	0	4	1
Wheelock	Warmingham	LM	0	1	0
Gowy	Huxley Bridge	LM	0	5	0
Wince Brook	ptc R.Irk	MLW	0	0	0
Blackshaw Brook	ptc R.Croal	MLW	0	3	0
Captains Clough	Cunliffe Brow	MLW	3	5	0
Clatter Brook	ptc Thornton Stream	MLW	0	2	0
Ditton Brook	ptc Halewood Brook	MLW	0	0	0
Ash Brook	ptc R.Roch	MLW	0	4	0
Wistaston Brook	Wistaston Green	MLW	0	1	0
Valley Brook	Radway	MLW	1	1	0
Oldhouse Brook	ptc Naden Brook	RJO	0	6	0
Tame	Wellihole Bridge	RT	0	3	4
Eagley Brook	u/s Charles Turner	TP	0	7	0
SUMMER					
Gowy	Gowy Bridge	LM	1	1	0
Sankey Brook	u/s A57	MLW	2	2	0
Ogden	ptc Swinney Brook	MLW	1	6	0

Table 26. Statistics of the 1996 Primary Audit results for North West Region

Analyst/Group	n	Mean gains	Standard error	No.samples >2 gains	% samples >2 gains	Highest no. gains	Mean errors (l+g+o)	Standard error
Central	13	1.85	0.41	4	30.77	4	2.38	0.49
ADE	2	1.00	0.00	0	0.00	1	1.50	0.50
AM	2	1.00	0.00	0	0.00	1	1.00	0.00
EIG	2	3.00	1.00	1	50.00	4	3.50	1.50
FD	1	2.00	n/a	0	0.00	2	4.00	n/a
JAW	2	2.00	2.00	1	50.00	4	2.50	1.50
KC	3	2.67	0.88	2	66.67	4	3.33	1.20
SLP	1	0.00	n/a	0	0.00	0	0.00	n/a
Northern	20	2.65	0.51	9	45.00	8	3.25	0.50
AJ	3	2.33	0.33	1	33.33	3	3.00	0.00
BJI	1	7.00	n/a	1	100.00	7	8.00	n/a
DS	7	4.57	0.65	7	100.00	8	5.00	0.58
HFH	5	0.60	0.24	0	0.00	1	1.60	0.40
NC	4	1.00	0.41	0	0.00	2	1.25	0.63
Southern	20	3.10	0.50	11	55.00	7	3.75	0.57
AG	2	3.50	2.50	1	50.00	6	3.50	2.50
JEB	2	4.00	0.00	2	100.00	4	4.50	0.50
LM	3	2.33	1.33	1	33.33	5	2.67	1.20
MLW	10	2.40	0.65	4	40.00	6	3.10	0.86
RJO	1	6.00	n/a	1	100.00	6	6.00	n/a
RT	1	3.00	n/a	1	100.00	3	7.00	n/a
TP	1	7.00	n/a	1	100.00	7	7.00	n/a
North West Region	53	2.62	0.29	24	45.28	8	3.23	0.31

Table 27. Net effects of the Primary Audit on BMWP score and number of scoring taxa for North West Region

Analyst/Group	n	Mean net effect on BMWP score	% of samples underestimated by score >13	Maximum underestimate of BMWP score	Mean net effect on no. of taxa	% of samples underestimated by >2 taxa	Maximum underestimate of no. of taxa
Central	13	6.77	23.08	24	1.38	23.08	4
ADE	2	0.50	0.00	6	0.50	0.00	1
AM	2	4.00	0.00	5	1.00	0.00	1
EIG	2	14.00	50.00	18	2.50	50.00	3
FD	1	4.00	0.00	4	1.00	0.00	1
JAW	2	10.50	50.00	24	1.50	50.00	4
KC	3	8.67	33.33	18	2.00	33.33	4
SLP	1	0.00	0.00	0	0.00	0.00	0
Northern	20	13.05	40.00	50	2.25	40.00	8
AJ	3	11.00	33.33	15	2.00	33.33	3
BJI	1	39.00	100.00	39	7.00	100.00	7
DS	7	26.29	85.71	50	4.29	85.71	8
HFH	5	-0.20	0.00	10	-0.20	0.00	1
NC	4	1.50	0.00	5	0.75	0.00	1
Southern	20	12.90	45.00	44	2.70	50.00	7
AG	2	16.50	50.00	27	3.50	50.00	6
JEB	2	16.00	100.00	16	4.00	100.00	4
LM	3	8.33	33.33	18	2.00	33.33	5
MLW	10	8.10	20.00	25	1.70	30.00	5
RJO	1	27.00	100.00	27	6.00	100.00	6
RT	1	16.00	100.00	16	3.00	100.00	3
TP	1	44.00	100.00	44	7.00	100.00	7
North West Region	53	11.45	37.74	50	2.21	39.62	8

Table 28 The families missed by North West Region's primary analysts

Family	n	% of North West Region's missed taxa in Primary Audit
Hydrobiidae (incl. Bithyniidae)	10	9.01
Hydrophilidae (incl. Hydraenidae)	8	7.21
Simuliidae	5	4.50
Planariidae (incl. Dugesiidae)	5	4.50
Hydroptilidae	5	4.50
Sphaeriidae	5	4.50
Psychomyiidae (incl. Ecnomidae)	4	3.60
Planorbidae	4	3.60
Leptoceridae	4	3.60
Elmidae	4	3.60
Scirtidae	4	3.60
Erpobdellidae	4	3.60
Dytiscidae (incl. Noteridae)	3	2.70
Sericostomatidae	3	2.70
Tipulidae	3	2.70
Caenidae	3	2.70
Asellidae	3	2.70
Dendrocoelidae	3	2.70
Rhyacophilidae (incl. Glossosomatidae)	3	2.70
Glossiphoniidae	2	1.80
Haliplidae	2	1.80
Baetidae	2	1.80
Sialidae	2	1.80
Lymnaeidae	2	1.80
Polycentropodidae	2	1.80
Nemouridae	2	1.80
Piscicolidae	1	0.90
Physidae	1	0.90
Ancylidae (incl. Acroloxidae)	1	0.90
Leuctridae	1	0.90
Perlodidae	1	0.90
Odontoceridae	1	0.90
Taeniopterygidae	1	0.90
Valvatidae	1	0.90
Lepidostomatidae	1	0.90
Chironomidae	1	0.90
Chloroperlidae	1	0.90
Heptageniidae	1	0.90
Goeridae	1	0.90
Ephemerellidae	1	0.90
TOTAL	111	100.00

Table 29 The species missed by North West Region's primary analysts

Species	n	% of North West Region's missed species in Primary Audit
Potamopyrgus jenkinsi (Smith)	10	8.40
Hydraena gracilis Germar	5	4.20
Elmis aenea (Muller)	4	3.36
Hydroptila sp.	4	3.36
Pisidium sp.	4	3.36
Simulium (Simulium) ornatum group	3	2.52
Polycelis nigra/tenuis	3	2.52
Dendrocoelum lacteum (Muller)	3	2.52
Caenis rivulorum Eaton	3	2.52
Elodes sp.	3	2.52
Sericostoma personatum (Spence)	3	2.52
Tinodes waeneri (L.)	3	2.52
Simulium (Eusimulium) aureum group	2	1.68
Dicranota sp.	2	1.68
Rhyacophila dorsalis (Curtis)	2	1.68
Polycentropus flavomaculatus (Pictet)	2	1.68
Erpobdellidae indet	2	1.68
Asellus aquaticus (L.)	2	1.68
Haliphus sp.	2	1.68
Oreodytes sanmarkii (Sahlberg)	2	1.68
Anisus vortex (L.)	2	1.68
Heptagenia lateralis (Curtis)	1	0.84
Helophorus sp.	1	0.84
Helophorus (Helophorus) flavipes/obscurus	1	0.84
Helophorus (Atracthelophorus) brevipalpis Bedel	1	0.84
Heptagenia sulphurea (Muller)	1	0.84
Hydrocyphon deflexicollis (Muller)	1	0.84
Isoperla grammatica (Poda)	1	0.84
Leuctra fusca (L.)	1	0.84
Limnius volckmari (Panzer)	1	0.84
Lymnaea peregra (Muller)	1	0.84
Lymnaea sp.	1	0.84
Lepidostoma hirtum (Fabricius)	1	0.84
Baetis rhodani (Pictet)	1	0.84
Lype sp.	1	0.84
Agabus sp./Ilybius sp.	1	0.84
Agapetus sp.	1	0.84
Amphinemura sulcicollis (Stephens)	1	0.84
Ancylus fluviatilis Muller	1	0.84
Armiger crista (L.)	1	0.84
Asellus meridianus Racovitza	1	0.84
Athripsodes albifrons (L.)	1	0.84
Athripsodes aterrimus (Stephens)	1	0.84
Chironomini	1	0.84
Athripsodes cinereus (Curtis)	1	0.84
Gyraulus albus (Muller)	1	0.84
Baetis vernus Curtis	1	0.84
Bathyomphalus contortus (L.)	1	0.84
Ceraclea sp.	1	0.84
Chloroperla torrentium (Pictet)	1	0.84
Chloroperla tripunctata (Scopoli)	1	0.84

Table 29 (continued)

Species	n	% of North West Region's missed species in Primary Audit
<i>Dina lineata</i> (Muller)	1	0.84
<i>Ephemerella ignita</i> (Poda)	1	0.84
<i>Erpobdella octoculata</i> (L.)	1	0.84
<i>Glossiphonia complanata</i> (L.)	1	0.84
<i>Glossiphonia heteroclita</i> (L.)	1	0.84
<i>Goera pilosa</i> (Fabricius)	1	0.84
<i>Athripsodes bilineatus</i> (L.)	1	0.84
Tanypodinae	1	0.84
<i>Odontocerum albicorne</i> (Scopoli)	1	0.84
<i>Valvata piscinalis</i> (Muller)	1	0.84
Tanytarsini	1	0.84
<i>Taeniopteryx nebulosa</i> (L.)	1	0.84
Sphaeriidae indet	1	0.84
<i>Sialis lutaria</i> (L.)	1	0.84
<i>Sialis fuliginosa</i> Pictet	1	0.84
<i>Nemoura avicularis</i> Morton	1	0.84
Planariidae indet	1	0.84
<i>Piscicola geometra</i> (L.)	1	0.84
<i>Physa</i> sp.	1	0.84
<i>Mystacides azurea</i> (L.)	1	0.84
<i>Oxyethira</i> sp.	1	0.84
<i>Polycelis felina</i> (Dalyell)	1	0.84
<i>Tipula</i> (<i>Yamatotipula</i>) <i>montium</i> group	1	0.84
TOTAL	119	100.00

AUDIT OF SOUTHERN REGION'S PRIMARY ANALYSTS

Table 30. The 30 samples audited for the Eastern Area of Southern Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Powderhill Stream	Plough Inn	E3	0	2	0
Cradlebridge Sewer	Redhill Bridge	E11	0	2	0
East Stour	Aldington Road	E19	0	1	0
Great Stour	Bucksford	E19	0	0	0
Brede Tributary 45	Stubb Lane	E26	0	1	0
Great Stour	Whitemill Bridge	E26	2	4	0
Great Stour	Blackmill Bridge	E28	0	2	1
Shuttle	Black Prince	E28	1	0	0
SUMMER					
Beult	Yalding	E11	0	5	0
Wateringbury Stream	Wateringbury	E11	0	0	0
Newmill Channel	Potmans Heath	E19	1	1	0
Teise Tributary	Kilndown - Risebridge Farm	E21	0	1	0
Shortbridge Stream	Shortbridge Mill	E26	1	3	1
Uck	Hastingford Bridge	E26	0	4	0
AUTUMN					
Great Stour	Little Chart	E4	0	2	0
Pippingford Brook Tributary	Half Moon	E30	1	6	0
Bewl	A21 Bewl Bridge	E19	0	3	0
Tillingham	Beckley Furnace	E19	0	2	0
Brede	Brede Bridge	E19	1	4	0
Vinehall Stream	u/s EWWC abstraction	E26	1	7	0
Eridge Stream	Eridge Station	E26	2	3	0
Shortbridge Stream	Shortbridge Mill	E26	0	3	0
Loose Stream	Ivy Mill	E28	1	1	0
Medway	Balls Green, Withyham	E28	0	3	0
Eden	Edenbridge	E29	0	2	0
Botany Stream	Postern Lane	E29	0	1	0
Kent Rother	Newenden	E29	1	2	0
Hammer Stream	Buckhurst	E29	0	4	0
Corkwood Stream	Old House Farm	E29	0	2	0
Great Stour	Whitemill Bridge	E30	0	4	0

Table 31.

The 30 samples audited for the Western Area of Southern Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Hamble	Site 1 - u/s Bishops Waltham STW	E23	0	2	0
Darkwater	Gatewood Bridge	W1	0	0	0
Fletchwood Stream	Woodlands	W14	0	5	0
Sherfield English Stream	Cross Oak Farm	W14	0	1	0
Dark Alley Gill	Rhodos Arch	W15	0	0	0
Blackwater	Nutsey Bridge	W21	0	1	0
Plummers Water	Site 2 - d/s Garden Centre	W21	0	2	0
Chichester Canal	A27 Bypass Bridge	W21	0	1	0
Monks Brook	Chestnut Avenue	W23	0	4	0
Arun	Wellcross Bridge	W23	2	2	0
Blackwater	Hampworth Bridge	W23	0	0	0
Arun	Bucks Green	W27	0	1	0
AUTUMN					
Costers Brook	Selham Road	W9	0	1	2
Shedfield Stream	Barn Farm	W13	0	0	0
Crofton Stream	Crofton Dairy Farm	W13	0	2	0
Arle	Drove Lane	W13	0	1	0
Wroxall Stream	Redhill Lane	W15	0	2	0
Thorley Brook	Thorley Bridge	W15	0	2	0
Adur East	Wortleford Bridge	W15	0	2	0
Aldingbourne Rife	A259 Bridge	W19	1	0	0
Test	Wherwell	W26	0	3	0
Rother (Western)	Fittleworth Mill (d/s)	W26	1	2	0
Costers Brook	Cocking Church	W26	1	3	0
Hoeford Lake	B3385 Bridge	W26	0	0	0
Test	Overton	W26	0	0	0
Copyhold Stream	Abbots Ford	W26	1	1	0
Blakes Gill	u/s Scolliers Bridge	W26	0	1	0
Ashley Stream	White Croft	W27	0	2	1
Danes Stream	Milford	W27	0	0	2
Test	Mayfly Inn	W27	0	1	0

Table 32. Statistics of the 1996 Primary Audit results for Southern Region

Analyst/Group	n	Mean gains	Standard error	No.samples >2 gains	% samples >2 gains	Highest no. gains	Mean errors (l+g+o)	Standard error
Eastern	30	2.50	0.31	13	43.33	7	2.97	0.36
E3	1	2.00	n/a	0	0.00	2	2.00	n/a
E4	1	2.00	n/a	0	0.00	2	2.00	n/a
E11	3	2.33	1.45	1	33.33	5	2.33	1.45
E19	6	1.83	0.60	2	33.33	4	2.17	0.70
E21	1	1.00	n/a	0	0.00	1	1.00	n/a
E26	7	3.57	0.69	6	85.71	7	4.57	0.84
E28	4	1.50	0.65	1	25.00	3	2.25	0.48
E29	5	2.20	0.49	1	20.00	4	2.40	0.51
E30	2	5.00	1.00	2	100.00	6	5.50	1.50
Western	30	1.40	0.23	4	13.33	5	1.77	0.25
E23	1	2.00	n/a	0	0.00	2	2.00	n/a
W1	1	0.00	n/a	0	0.00	0	0.00	n/a
W9	1	1.00	n/a	0	0.00	1	3.00	n/a
W13	3	1.00	0.58	0	0.00	2	1.00	0.58
W14	2	3.00	2.00	1	50.00	5	3.00	2.00
W15	4	1.50	0.50	0	0.00	2	1.50	0.50
W19	1	0.00	n/a	0	0.00	0	1.00	n/a
W21	3	1.33	0.33	0	0.00	2	1.33	0.33
W23	3	2.00	1.15	1	33.33	4	2.67	1.33
W26	7	1.43	0.48	2	28.57	3	1.86	0.59
W27	4	1.00	0.41	0	0.00	2	1.75	0.48
Southern Region	60	1.95	0.21	17	28.33	7	2.37	0.23

Table 33. Net effects of the Primary Audit on BMWP score and number of scoring taxa for South West Region

Analyst/Group	n	Mean net effect on BMWP score	% of samples underestimated by score >13	Maximum underestimate of BMWP score	Mean net effect on no. of taxa	% of samples underestimated by >2 taxa	Maximum underestimate of no. of taxa
Eastern	30	12.90	46.67	43	2.10	33.33	6
E11	3	11.67	33.33	27	2.33	33.33	5
E19	6	8.67	33.33	19	1.50	33.33	3
E21	1	5.00	0.00	5	1.00	0.00	1
E26	7	18.86	71.43	35	2.71	42.86	6
E28	4	5.50	25.00	19	1.00	25.00	3
E29	5	10.20	40.00	23	2.00	20.00	4
E3	1	10.00	0.00	10	2.00	0.00	2
E30	2	32.50	100.00	43	4.50	100.00	5
E4	1	15.00	100.00	15	2.00	0.00	2
Western	30	7.27	20.00	24	1.20	10.00	5
E23	1	15.00	100.00	15	2.00	0.00	2
W1	1	0.00	0.00	0	0.00	0.00	0
W13	3	4.00	0.00	9	1.00	0.00	2
W14	2	14.50	50.00	24	3.00	50.00	5
W15	4	7.25	0.00	10	1.50	0.00	2
W19	1	-5.00	0.00	-5	-1.00	0.00	-1
W21	3	8.33	33.33	15	1.33	0.00	2
W23	3	6.33	33.33	21	1.33	33.33	4
W26	7	8.57	14.29	22	1.00	14.29	3
W27	4	6.00	25.00	15	1.00	0.00	2
W9	1	10.00	0.00	10	1.00	0.00	1
Southern Region	60	10.08	33.33	43	1.65	21.67	6

Table 34. The families missed by Southern Region's primary analysts

Family	n	% of Southern Region's missed taxa in Primary Audit
Dendrocoelidae	7	6.80
Hydroptilidae	7	6.80
Simuliidae	5	4.85
Leptoceridae	5	4.85
Leptophlebiidae	5	4.85
Hydrophilidae (incl. Hydraenidae)	5	4.85
Valvatidae	4	3.88
Tipulidae	4	3.88
Asellidae	3	2.91
Lepidostomatidae	3	2.91
Sericostomatidae	3	2.91
Psychomyiidae (incl. Ecnomidae)	3	2.91
Planariidae (incl. Dugesiidae)	3	2.91
Ancylidae (incl. Acroloxidae)	3	2.91
Caenidae	3	2.91
Hydrometridae	3	2.91
Hydrobiidae (incl. Bithyniidae)	3	2.91
Elmidae	2	1.94
Chironomidae	2	1.94
Dytiscidae (incl. Noteridae)	2	1.94
Piscicolidae	2	1.94
Ephemerellidae	2	1.94
Beraeidae	2	1.94
Hydropsychidae	2	1.94
Gammaridae (incl. Crangonyctidae)	2	1.94
Erpobdellidae	2	1.94
Dryopidae	1	0.97
Goeridae	1	0.97
Chloroperlidae	1	0.97
Coenagriidae	1	0.97
Calopterygidae	1	0.97
Planorbidae	1	0.97
Sphaeriidae	1	0.97
Lymnaeidae	1	0.97
Gomphidae	1	0.97
Baetidae	1	0.97
Haliplidae	1	0.97
Nemouridae	1	0.97
Molannidae	1	0.97
Heptageniidae	1	0.97
Gerridae	1	0.97
Glossiphoniidae	1	0.97
TOTAL	103	100.00

Table 35. The species missed by Southern region's primary analysts

Species	n	% of Southern Region's missed species in Primary Audit
Dendrocoelum lacteum (Muller)	7	6.48
Hydroptila sp.	7	6.48
Simulium (Simulium) ornatum group	4	3.70
Sericostoma personatum (Spence)	3	2.78
Habrophlebia fusca (Curtis)	3	2.78
Potamopyrgus jenkinsi (Smith)	3	2.78
Ancylus fluviatilis Muller	3	2.78
Lepidostoma hirtum (Fabricius)	3	2.78
Valvata piscinalis (Muller)	3	2.78
Hydraena gracilis Germar	3	2.78
Hydrometra sp.	2	1.85
Orthocladiinae	2	1.85
Gammarus pulex (L.)	2	1.85
Pilaria (Pilaria) sp.	2	1.85
Piscicola geometra (L.)	2	1.85
Dugesia tigrina (Girard)	2	1.85
Ephemerella ignita (Poda)	2	1.85
Elmis aenea (Muller)	2	1.85
Caenis luctuosa/macrura	2	1.85
Beraeodes minutus (L.)	2	1.85
Asellus aquaticus (L.)	2	1.85
Athripsodes sp.	2	1.85
Nemoura avicularis Morton	1	0.93
Ischnura elegans (Van der Linden)	1	0.93
Ithytrichia sp.	1	0.93
Valvata cristata Muller	1	0.93
Lymnaea sp.	1	0.93
Tinodes waeneri (L.), Lype sp.	1	0.93
Lype sp.	1	0.93
Simulium (Nevermannia) cryophilum group	1	0.93
Mystacides azurea (L.)	1	0.93
Pisidium sp.	1	0.93
Simulium (Boophthora) erythrocephalum (deGeer)	1	0.93
Oulimnius sp.	1	0.93
Paraleptophlebia sp.	1	0.93
Paraleptophlebia submarginata (Stephens)	1	0.93
Silo sp.	1	0.93
Potamonectes depressus/elegans	1	0.93
Polycelis nigra/tenuis	1	0.93
Molanna angustata Curtis	1	0.93
Adicella/Triaenodes group	1	0.93
Hydropsyche sp.	1	0.93
Tinodes waeneri (L.)	1	0.93
Adicella reducta (Mclachlan)	1	0.93
Antocha vitripennis (Meigen)	1	0.93
Armiger crista (L.)	1	0.93
Asellus meridianus Racovitza	1	0.93
Baetis vernus Curtis	1	0.93
Caenis rivulorum Eaton	1	0.93
Calopteryx splendens (Harris)	1	0.93
Chloroperla torrentium (Pictet)	1	0.93

Table 35 (continued)

Species	n	% of Southern Region's missed species in Primary Audit
Dicranota (Dicranota) sp.	1	0.93
Dicranota sp.	1	0.93
Dryops sp.	1	0.93
Hydraena riparia Kugelann	1	0.93
Erioptera sp.	1	0.93
Hydroporus tessellatus Drapiez	1	0.93
Hydropsyche siltalai Dohler	1	0.93
Hydrometra stagnorum (L.)	1	0.93
Heptagenia sulphurea (Muller)	1	0.93
Helophorus (Helophorus) minutus Fabricius	1	0.93
Haliplus fluviatilis Aube	1	0.93
Gomphus vulgatissimus (L.)	1	0.93
Glossiphonia heteroclita (L.)	1	0.93
Gerris (Gerris) lacustris (L.)	1	0.93
Erpobdellidae indet	1	0.93
Erpobdella octoculata (L.)	1	0.93
TOTAL	108	100.00

AUDIT OF SOUTH WEST REGION'S PRIMARY ANALYSTS

Table 36. The 18 samples audited for the Cornwall Area of South West Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Small Brook	Youlden Bridge	RJW	0	1	0
Trethurgy Stream	u/s Confluence	RJW	0	3	0
Goonhusband Tributary	Goonhusband	RJW	0	2	0
Penrose Stream	Penrose	RJW	0	2	0
Newlyn	Buryas Bridge	RJW	0	0	0
Lamorna Stream	Lamorna	RJW	0	1	0
Small Brook	Headon Bridge	RJW	0	0	0
Small Brook	Youlden Bridge	RJW	0	1	0
Small Brook	u/s R. Tamar	RJW	1	1	0
Tamar	u/s Small Brook	RJW	1	1	1
Lyd	u/s Ambrosia Bridge	TAB	0	1	0
SUMMER					
Milton Coombe Stream	d/s Milton Coombe	KAI	0	0	0
Coads Green Stream	u/s Coads Green	RJW	0	1	0
Tredavoe	u/s Tredavoe	RJW	1	3	0
St Keverne	u/s St Keverne	RJW	1	1	0
AUTUMN					
Camel	Poleys Bridge	KAI	0	0	0
Colesmill Stream	d/s Holsworthy STW	KAI	0	0	0
Tamar	d/s Small Brook	RJW	0	0	0

Table 37. The 20 samples audited for the Devon Area of South West Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Mere	A386 Bridge	AA	0	0	0
Kenn	A38 Bridge, Kennford	AA	0	0	0
Knowl Water	Wrafton Bridge	AH	0	1	0
SUMMER					
Bray	d/s Brayford STW	AA	0	1	0
Dodscott Brook Tributary	d/s Discharge	AA	0	0	0
Exe	u/s STW discharge	AA	0	0	0
Mere Tributary	d/s Merton STW	AA	0	2	0
Spires Lake	u/s Track Bridge	AH	3	1	0
Madford Brook Tributary	d/s Shillingford St George STW	LK	0	4	0
Bovey	u/s North Bovey STW	LK	0	2	0
Aller Brook Tributary	Coffinswell STW d/s 2	LK	0	0	0
Southpool Stream	u/s Kernborough STW	LK	0	3	0
Lew	Hatherleigh Bridge	PG	0	1	0
Tale	u/s Talaton Stream confluence	WO	0	0	0
Kenn	A38 Bridge, Kennford	WO	0	0	0
Churchingford Stream	u/s STW discharge	WO	0	2	0
Erme	u/s Stowford Weir	WO	0	0	0
AUTUMN					
Kenn	Brenton Farm	AA	0	1	0
Axe	Nunford Dairy	LK	0	1	0
Colley Lake	u/s Lenton Ford	WO	0	2	0

Table 38. The 20 samples audited for the North Wessex Area of South West Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Wellow Brook	Site 1 Farm Dairies	AH	0	1	0
Wellow Brook	Site 3 u/s Rescam	AH	0	1	0
Whitelake	u/s Steanbow Bridge	APH	0	0	2
Trym	u/s Stoke Rd C.S.O.	JF	0	0	0
SUMMER					
Brue	u/s Ansford STW	AB	0	0	0
Cam Brook	Dunkerton	AH	0	1	0
Clutton Stream	d/s Clutton Site 4	AH	0	1	0
Brue	South Brewham	APH	0	1	0
Combe Brook	d/s C.S.O.	JF	0	2	0
Hephill's Rhine Tributary	Site 1 d/s Harnhill Quarry	JF	0	1	0
Bristol Avon	Lacock, d/s Bewley STW	JL	0	0	0
Unknown watercourse	d/s Grittleton STW	JL	1	3	0
AUTUMN					
Yeo	GQA 4201	AB	0	0	0
Washford	d/s Luxborough STW	AB	0	0	0
Yeo Tributary	d/s Sutton Montis STW	AB	0	0	0
English Coombe	Post Office Stream	JL	0	0	0
Yeo	u/s Lake WTW	JL	1	1	0
Upper Somerset Frome	Site 6	JL	1	4	0
Tone	u/s Sandylands STW	SG	0	2	1
Venners Water	u/s Ashill STW	SG	0	1	0

Table 39. The 20 samples audited for the South Wessex Area of South West Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Frome	Holme Bridge	BJJ	0	3	0
Key Brook	Joliffes Farm	HY	0	2	0
Nadder	Wilton	HY	0	2	0
Hampshire Avon	Hale Park	HY	0	3	0
Ebble Tributary	Mount Sorrel	JP	1	1	0
Clockhouse Brook	Burton	JP	1	0	0
Key Brook Tributary	Angel Farm	PRH	0	1	0
Iwerne	Stourpaine	PRH	0	1	0
Stour	Blackwater Junction	PRH	0	3	0
SUMMER					
Moors	u/s Moors Close STW	HY	0	1	0
Moors	d/s Moors Close STW	HY	0	1	0
Western Avon Tributary	d/s Stanton St Bernard	HY	0	1	0
Worth Matravers	u/s Worth Matravers STW	HY	0	0	0
Bow Brook Tributary	u/s Yenston STW	JP	0	2	0
AUTUMN					
Sem	Bilhay Farm	HY	0	2	0
Wonston Stream	d/s Wonston	HY	1	2	0
Stour	Parley Green	HY	0	0	0
Stour	Berry Hill	HY	0	1	0
Key Brook	Blynfield Farm	PRH	0	2	0
Manston Brook	Hay Bridge	PRH	0	2	0

Table 40. Statistics of the 1996 Primary Audit results for South West Region

Analyst/Group	n	Mean gains	Standard error	No.samples >2 gains	% samples >2 gains	Highest no. gains	Mean errors (l+g+o)	Standard error
Cornwall	18	1.00	0.23	2	11.11	3	1.28	0.29
KAI	3	0.00	0.00	0	0.00	0	0.00	0.00
RJW	14	1.21	0.26	2	14.29	3	1.57	0.33
TAB	1	1.00	n/a	0	0.00	1	1.00	n/a
Devon	20	1.05	0.26	2	10.00	4	1.20	0.30
AA	7	0.57	0.30	0	0.00	2	0.57	0.30
AH	2	1.00	0.00	0	0.00	1	2.50	1.50
LK	5	2.00	0.71	2	40.00	4	2.00	0.71
PG	1	1.00	n/a	0	0.00	1	1.00	n/a
WO	5	0.80	0.49	0	0.00	2	0.80	0.49
North Wessex	20	0.95	0.25	2	10.00	4	1.25	0.32
AB	4	0.00	0.00	0	0.00	0	0.00	0.00
AH	4	1.00	0.00	0	0.00	1	1.00	0.00
APH	2	0.50	0.50	0	0.00	1	1.50	0.50
JF	3	1.00	0.58	0	0.00	2	1.00	0.58
JL	5	1.60	0.81	2	40.00	4	2.20	1.02
SG	2	1.50	0.50	0	0.00	2	2.00	1.00
South Wessex	20	1.50	0.21	3	15.00	3	1.65	0.21
BJJ	1	3.00	n/a	1	100.00	3	3.00	n/a
HY	11	1.36	0.28	1	9.09	3	1.45	0.31
JP	3	1.00	0.58	0	0.00	2	1.67	0.33
PRH	5	1.80	0.37	1	20.00	3	1.80	0.37
South West Region	78	1	0.12	9.00	11.54	4.00	1	0.14

Table 41. Net effects of the Primary Audit on BMWP score and number of scoring taxa for South West Region

Analyst/Group	n	Mean net effect on BMWP score	% of samples underestimated by score >13	Maximum underestimate of BMWP score	Mean net effect on no. of taxa	% of samples underestimated by >2 taxa	Maximum underestimate of no. of taxa
Cornwall	18	4.50	11.11	25	0.78	5.56	3
KAI	3	0.00	0.00	0	0.00	0.00	0
RJW	14	5.29	14.29	25	0.93	7.14	3
TAB	1	7.00	0.00	7	1.00	0.00	1
Devon	20	5.65	15.00	23	0.90	10.00	4
AA	7	3.29	0.00	12	0.57	0.00	2
AH	2	3.00	0.00	10	-0.50	0.00	1
LK	5	11.80	40.00	23	2.00	40.00	4
PG	1	5.00	0.00	5	1.00	0.00	1
WO	5	4.00	20.00	14	0.80	0.00	2
North Wessex	20	5.20	5.00	28	0.80	5.00	3
AB	4	0.00	0.00	0	0.00	0.00	0
AH	4	8.50	0.00	10	1.00	0.00	1
APH	2	2.50	0.00	5	0.50	0.00	1
JF	3	3.67	0.00	6	1.00	0.00	2
JL	5	8.40	20.00	28	1.00	20.00	3
SG	2	6.00	0.00	9	1.50	0.00	2
South Wessex	20	7.65	15.00	20	1.35	15.00	3
BJJ	1	17.00	100.00	17	3.00	100.00	3
HY	11	6.55	9.09	14	1.27	9.09	3
JP	3	1.67	0.00	8	0.33	0.00	2
PRH	5	11.80	20.00	20	1.80	20.00	3
South West Region	78	5.78	11.54	28	0.96	8.97	4

Table 42 The families missed by South West Region's primary analysts

Family	n	% of South West Region's missed taxa in Primary Audit
Hydrophilidae (incl. Hydraenidae)	7	8.97
Hydrobiidae (incl. Bithyniidae)	5	6.41
Leptophlebiidae	4	5.13
Asellidae	4	5.13
Lymnaeidae	3	3.85
Hydroptilidae	3	3.85
Baetidae	3	3.85
Caenidae	3	3.85
Rhyacophilidae (incl. Glossosomatidae)	3	3.85
Elmidae	3	3.85
Leptoceridae	3	3.85
Physidae	2	2.56
Planariidae (incl. Dugesiidae)	2	2.56
Psychomyiidae (incl. Ecnomidae)	2	2.56
Sphaeriidae	2	2.56
Tipulidae	2	2.56
Valvatidae	2	2.56
Philopotamidae	2	2.56
Perlodidae	2	2.56
Limnephilidae	2	2.56
Goeridae	2	2.56
Lepidostomatidae	2	2.56
Brachycentridae	2	2.56
Calopterygidae	1	1.28
Hydrometridae	1	1.28
Gyrinidae	1	1.28
Erpobdellidae	1	1.28
Dendrocoelidae	1	1.28
Simuliidae	1	1.28
Nepidae	1	1.28
Coenagriidae	1	1.28
Phryganeidae	1	1.28
Planorbidae	1	1.28
Piscicolidae	1	1.28
Leuctridae	1	1.28
Scirtidae	1	1.28
TOTAL	78	100.00

Table 43 The species missed by South West Region's primary analysts

Species	n	% of South West Region's missed species in Primary Audit
Potamopyrgus jenkinsi (Smith)	5	6.41
Asellus aquaticus (L.)	3	3.85
Caenis rivulorum Eaton	2	2.56
Pisidium sp.	2	2.56
Helophorus (Atracthelophorus) brevipalpis Bedel	2	2.56
Hydraena gracilis Germar	2	2.56
Hydroptila sp.	2	2.56
Brachycentrus subnubilus Curtis	2	2.56
Lymnaea truncatula (Muller)	2	2.56
Valvata piscinalis (Muller)	2	2.56
Paraleptophlebia submarginata (Stephens)	1	1.28
Limnebius truncatellus (Thunberg)	1	1.28
Wormaldia occipitalis (Pictet)	1	1.28
Lymnaea sp.	1	1.28
Tipula (Yamatotipula) montium group	1	1.28
Mystacides azurea (L.)	1	1.28
Tinodes waeneri (L.)	1	1.28
Nepa cinerea L.	1	1.28
Orectochilus villosus (Muller)	1	1.28
Psychomyia pusilla (Fabricius)	1	1.28
Oulimnius tuberculatus (Muller)	1	1.28
Paraleptophlebia sp.	1	1.28
Philopotamus montanus (Donovan)	1	1.28
Phryganeidae indet	1	1.28
Physa acuta/heterostrophia	1	1.28
Physa fontinalis (L.)	1	1.28
Pilaria (Pilaria) sp.	1	1.28
Piscicola geometra (L.)	1	1.28
Simulium (Simulium) ornatum group	1	1.28
Polycelis nigra/tenuis	1	1.28
Silo pallipes (Fabricius)	1	1.28
Leuctra fusca (L.)	1	1.28
Rhyacophila dorsalis (Curtis)	1	1.28
Oulimnius sp.	1	1.28
Baetis rhodani (Pictet)	1	1.28
Dendrocoelum lacteum (Muller)	1	1.28
Crunoecia irrorata (Curtis)	1	1.28
Coenagriidae indet	1	1.28
Calopteryx sp.	1	1.28
Dugesia lugubris/polychroa	1	1.28
Baetis scambus group	1	1.28
Baetis buceratus Eaton	1	1.28
Athripsodes sp.	1	1.28
Anabolia nervosa (Curtis)	1	1.28
Agraylea multipunctata Curtis	1	1.28
Agapetus sp.	1	1.28
Adicella reducta (McLachlan)	1	1.28
Leptophlebiidae indet	1	1.28
Perlodes microcephala (Pictet)	1	1.28
Caenis luctuosa group	1	1.28
Halesus digitatus/radiatus	1	1.28

Table 43 (continued)

Species	n	% of South West Region's missed species in Primary Audit
Asellus meridianus Racovitza	1	1.28
Elmis aenea (Muller)	1	1.28
Lepidostoma hirtum (Fabricius)	1	1.28
Hydraena riparia Kugelann	1	1.28
Isoperla grammatica (Poda)	1	1.28
Helophorus (Meghelophorus) grandis Illiger	1	1.28
Hydrometra sp.	1	1.28
Habrophlebia fusca (Curtis)	1	1.28
Gyraulus albus (Muller)	1	1.28
Goera pilosa (Fabricius)	1	1.28
Glossosoma sp.	1	1.28
Erpobdellidae indet	1	1.28
Elodes sp.	1	1.28
TOTAL	78	100.00

AUDIT OF THAMES REGION'S PRIMARY ANALYSTS

Table 44. The 30 samples audited for the Fobney Mead Laboratory of Thames Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SUMMER					
Letcombe Brook	Weir Farm, East Hanney	303	1	2	0
Thames	3 Valleys Water Intake	303	1	4	0
Mole	u/s Gatwick Stream	303	2	1	1
Bloxham Brook	u/s Sor Brook	317	0	2	0
Caker Stream	d/s Alton STW	317	0	0	0
Lyde	Deanlands Farm	317	0	6	0
Thame	Wheatley Bridge	317	0	0	0
AUTUMN					
Silchester Brook	d/s Silchester STW	317	0	0	0
Clayhill Brook	d/s Burghfield STW	317	1	1	0
Foudry Brook	Hartley Court Farm	317	1	2	0
Chacombe Brook	u/s Cherwell, A361	317	0	2	1
Deddington Brook	Cold Harbour Farm	317	0	0	0
Bennets Ditch	A418 Bridge, Oxford	317	0	1	0
Bourne	u/s Thames	317	0	4	1
Slade Barn Stream	d/s Guiting Power	317	0	1	0
Kennet	Water inlet, Chilton Foliat	317	0	0	0
Blunsdon Brook	Water Eaton	317	0	2	0
Lydiard Brook	u/s R.Ray	317	0	2	1
Ray	Seven Bridges	317	0	3	0
Ray	Moredon Bridge	317	0	6	0
South Marston Brook	Nightingale Lane	317	0	2	0
Lydiard Brook	d/s Lydiard Millicent STW	317	0	0	0
Haydon Wick Brook	u/s R.Ray	317	0	0	0
Wadley Stream	u/s R.Thames	317	0	1	0
Broadwell Brook	Friars Court	317	0	1	0
Faringdon Brook	A4095, Great Faringdon	317	0	3	0
Highmoor Brook	d/s Brize Norton Stream	317	0	3	0
Radcot Cut	u/s Great Brook	317	0	4	0
Lashlake Stream	u/s Scotsgrove Brook	317	0	2	0
Scotsgrove Brook	u/s Haddenham STW	317	0	1	0

Table 45. The 30 samples audited for the Waltham Cross Laboratory of Thames Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Ver	Sopwell	DJL	1	3	0
Ver	d/s Holywell Hill	DJL	0	1	0
SUMMER					
Kitts End Stream	d/s Wrotham Park Stream	DJL	0	1	0
Stevenage Brook	Frogmore Hall	DJL	0	2	0
Dane End Tributary	At Sacombe	DJL	0	1	0
Colne	u/s Thames	RJC	0	4	0
Chess	d/s Bois Mill	RJC	1	3	0
Colne	Halfway House PH	RJC	0	6	0
Mimmshall Brook	A1081 Bridge	RJC	0	1	0
Potters Bar Brook	u/s Mimmshall Brook	RJC	0	1	0
Catherine Bourne	Rabley Park	RJC	0	4	0
AUTUMN					
Rib	u/s Gatesbury Weir	DJL	0	0	0
Rib	B1386 Bridge, Gatesbury	DJL	0	2	0
Beck	d/s Kelsey Park Lake	JM	0	1	0
Beck	Cator Park	JM	0	4	0
Pool	Winsford Road	JM	0	2	0
Beck	u/s Kelsey Park Lake	JM	0	0	0
Beck	High Broom Wood	JM	0	2	0
Wandle	Goat Bridge	JM	0	5	0
Kydbrook East	Derwent Drive	JM	1	1	0
Corbetts Tey Brook	d/s Tributary	JM	0	2	0
Quaggy	Dermody Road	JM	0	1	0
Colne	d/s Moorfield Road	RJC	0	2	0
New Years Green Bourne	u/s Frays River	RJC	1	3	0
Aldbourn	d/s Fulmer	RJC	0	2	0
Aldbourn	A412 Bridge, Denham	RJC	1	2	0
Ellen Brook	u/s Colne	RJC	1	2	0
Ravensbourne	Beckenham Place Park	RJC	0	4	0
Wraysbury	Staines Moor	RJC	0	2	0
Colne (Stockers Reach)	u/s Weir, Maple Cross	RJC	1	2	0

Table 46. Statistics of the 1996 Primary Audit results for Thames Region

Analyst/Group	n	Mean gains	Standard error	No.samples >2 gains	% samples >2 gains	Highest no. gains	Mean errors (l+g+o)	Standard error
Fobney Mead	30	1.87	0.31	8	26.67	6	2.20	0.33
303	3	2.33	0.88	1	33.33	4	4.00	0.58
317	27	1.81	0.33	7	25.93	6	2.00	0.35
Waltham Cross	30	2.20	0.26	9	30.00	6	2.43	0.27
DJL	7	1.43	0.37	1	14.29	3	1.57	0.48
JM	9	2.00	0.53	2	22.22	5	2.11	0.51
RJC	14	2.71	0.37	6	42.86	6	3.07	0.37
Thames Region	60	2.03	0.20	17	28.33	6	2.32	0.21

Table 47. Net effects of the Primary Audit on BMWP score and number of scoring taxa for Thames Region

Analyst/Group	n	Mean net effect on BMWP score	% of samples underestimated by score >13	Maximum underestimate of BMWP score	Mean net effect on no. of taxa	% of samples underestimated by >2 taxa	Maximum underestimate of no. of taxa
Fobney Mead	30	8.47	23.33	36	1.67	26.67	6
303	3	7.00	33.33	21	1.00	33.33	3
317	27	8.63	22.22	36	1.74	25.93	6
Waltham Cross	30	10.70	33.33	35	1.97	20.00	6
DJL	7	7.86	28.57	15	1.29		2
JM	9	9.11	33.33	22	1.89	22.22	5
RJC	14	13.14	35.71	35	2.36	28.57	6
Thames Region	60	9.58	28.33	36	1.82	23.33	6

Table 48. The families missed by Thames Region's primary analysts

Family	n	% of Thames Region's missed taxa in Primary Audit
Elmidae	10	8.55
Valvatidae	9	7.69
Baetidae	6	5.13
Hydroptilidae	6	5.13
Simuliidae	6	5.13
Planariidae (incl. Dugesiiidae)	5	4.27
Physidae	5	4.27
Hydropsychidae	5	4.27
Haliplidae	5	4.27
Dendrocoelidae	5	4.27
Dytiscidae (incl. Noteridae)	4	3.42
Glossiphoniidae	4	3.42
Hydrobiidae (incl. Bithyniidae)	4	3.42
Hydrophilidae (incl. Hydraenidae)	4	3.42
Coenagriidae	3	2.56
Psychomyiidae (incl. Ecnomidae)	3	2.56
Polycentropodidae	3	2.56
Caenidae	3	2.56
Planorbidae	3	2.56
Ancylidae (incl. Acroloxidae)	3	2.56
Goeridae	3	2.56
Lymnaeidae	3	2.56
Sphaeriidae	2	1.71
Brachycentridae	2	1.71
Aphelocheiridae	2	1.71
Tipulidae	2	1.71
Rhyacophilidae (incl. Glossosomatidae)	1	0.85
Limnephilidae	1	0.85
Corophiidae	1	0.85
Ephemerellidae	1	0.85
Dryopidae	1	0.85
Sialidae	1	0.85
Sericostomatidae	1	0.85
TOTAL	117	100.00

Table 49. The species missed by Thames Region's primary analysts

Species	n	% of Thames Region's missed species in Primary Audit
Elmis aenea (Muller)	7	5.69
Hydroptila sp.	6	4.88
Valvata piscinalis (Muller)	5	4.07
Dendrocoelum lacteum (Muller)	5	4.07
Haliphus sp.	5	4.07
Baetis rhodani (Pictet)	4	3.25
Simulium (Simulium) ornatum group	4	3.25
Valvata cristata Muller	4	3.25
Helobdella stagnalis (L.)	4	3.25
Coenagriidae indet	3	2.44
Caenis luctuosa/macrura	3	2.44
Oulimnius sp.	3	2.44
Physa fontinalis (L.)	3	2.44
Ancylus fluviatilis Muller	3	2.44
Gyraulus albus (Muller)	3	2.44
Potamopyrgus jenkinsi (Smith)	3	2.44
Pisidium sp.	2	1.63
Hydropsyche angustipennis (Curtis)	2	1.63
Polycelis nigra/tenuis	2	1.63
Oulimnius tuberculatus (Muller)	2	1.63
Lymnaea peregra (Muller)	2	1.63
Simulium (Eusimulium) aureum group	2	1.63
Aphelocheirus aestivalis (Fabricius)	2	1.63
Tinodes waeneri (L.)	2	1.63
Brachycentrus subnubilus Curtis	2	1.63
Tipula (Yamatotipula) montium group	1	0.81
Physa acuta/heterostrophia	1	0.81
Simulium (Nevermannia) angustitarse group	1	0.81
Pilaria (Pilaria) sp.	1	0.81
Polycentropus sp.	1	0.81
Silo sp.	1	0.81
Planariidae indet	1	0.81
Platambus maculatus (L.)	1	0.81
Plectrocnemia conspersa (Curtis)	1	0.81
Silo nigricornis (Pictet)	1	0.81
Sialis lutaria (L.)	1	0.81
Riolus subviolaceus (Muller)	1	0.81
Potamonectes sp.	1	0.81
Physa sp.	1	0.81
Bithynia tentaculata (L.)	1	0.81
Lype sp.	1	0.81
Sericostoma personatum (Spence)	1	0.81
Agabus sp./Ilybius sp.	1	0.81
Agapetus sp.	1	0.81
Baetis vernus Curtis	1	0.81
Cloeon dipterum (L.)	1	0.81
Corophium curvispinum Sars	1	0.81
Cyrrhus trimaculatus (Curtis)	1	0.81
Dryops sp.	1	0.81
Dugesia lugubris/polychroa	1	0.81
Dugesia tigrina (Girard)	1	0.81

Table 49 continued

Species	n	% of Thames Region's missed species in Primary Audit
<i>Ephemerella ignita</i> (Poda)	1	0.81
<i>Ilybius</i> sp.	1	0.81
<i>Lymnaea palustris</i> (Muller)	1	0.81
Limnephilidae indet	1	0.81
<i>Armiger crista</i> (L.)	1	0.81
<i>Glossiphonia complanata</i> (L.)	1	0.81
<i>Hydropsyche</i> sp.	1	0.81
<i>Hydropsyche siltalai</i> Dohler	1	0.81
<i>Hydraena riparia</i> Kugelann	1	0.81
<i>Goera pilosa</i> (Fabricius)	1	0.81
<i>Helophorus</i> (<i>Atracthelophorus</i>) <i>brevipalpis</i> Bedel	1	0.81
<i>Hydrobius fuscipes</i> (L.)	1	0.81
Hydrophilidae indet	1	0.81
<i>Hydropsyche contubernalis</i> Mclachlan	1	0.81
TOTAL	123	100.00

AUDIT OF WELSH REGION'S PRIMARY ANALYSTS

Table 50. The 20 samples audited for the Northern Area of Welsh Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Afon Fathew	u/s Bryn Crug STW	353	1	0	0
Afon y Garth	d/s Footbridge	355	0	1	0
Afon y Garth	u/s Site 6	355	0	1	0
Afon y Garth	u/s Adit	355	0	1	0
Bowydd	B4414 Bridge	356	0	3	0
SUMMER					
Afon Fathew	u/s Penybont WTW	372	1	3	0
Nant Llyn Morwnion	d/s Garreglwyd WTW	372	0	3	0
Nant Llyn Morwinion	u/s Garreglwyd WTW	372	0	1	0
Clywedog	u/s Wrexham Creamery	372	0	2	0
Un-named	u/s Ffrith STW	372	0	2	0
Un-named	d/s Ffrith STW	372	0	0	0
Un-named	d/s Hendre Tilcon STW	372	0	2	0
Clywedog	u/s Five Fords Old Outfall	372	0	2	1
Cefni	u/s Cefni WTW	372	0	3	1
Llyfni Tributary	u/s Cwmdulyn WTW	372	0	2	0
Un-named	d/s Cwm Dulyn WTW	372	0	0	0
Dee Tributary	u/s Rough Hill	372	1	0	0
Nant y Ffrith	d/s WTW	372	1	0	0
Dee	d/s Five Fords New Outfall	372	0	1	0
AUTUMN					
Dwryd	d/s Cynfal	355	1	4	0

Table 51. The 20 samples audited for the South Eastern Area of Welsh Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Taf Fechan	d/s Pontskill WTW	CM	0	0	0
Nant Cilieni	Site 3 d/s Stream	MC	0	0	0
SUMMER					
Taf Fawr	d/s Llwynon	CM	0	1	0
Nant Caerfanell	d/s Talybont WTW	CM	0	2	0
Nant Caerfanell	u/s Talybont WTW	CM	0	1	0
Grwyne Fawr	d/s Grwyne Fawr WTW	CM	1	4	0
Lugg	u/s Byton WTW	CM	0	3	0
Mychydd Tributary	Nr Royal Mint	CM	1	2	0
Colghton Brook	Walford u/s	MC	0	2	0
Porset Brook	Lansbury Park	MC	0	0	0
Nant-yr-Aber	Caerphilly	MC	0	1	0
Mynachdy Brook	u/s Tafarn Trolth STW	MC	0	1	0
Nant-y-Glaswg	d/s Creigiau STW	MC	0	2	0
Clydach	u/s Anacomp	MC	0	2	0
Newbridge Brook	d/s Weobley STW	MC	0	0	0
Yazor Brook	u/s Burghill STW	MC	0	4	0
AUTUMN					
Taf Fawr	u/s Llwyn-on Reservoir	CM	0	2	1
Taf Fawr	u/s Llwynon RGS	CM	1	6	0
Nant Cadlan	d/s Penderyn Quarry	CM	0	0	0
Cadoxton	d/s Dow Corning	CM	0	0	0

Table 52. The 20 samples audited for the South Western Area of Welsh Region

River	Site	Primary Analyst	Losses	Gains	Omissions
SPRING					
Clyne	Site 12 - WQ site	SL	0	1	0
SUMMER					
Saundersfoot Stream	Site 2, d/s STW	JG	0	2	0
Teifi	u/s Llandyssul STW	JG	0	3	2
Tawe	d/s Ystradgynlais STW	JG	0	2	0
Tywi	d/s Llandovery STW	JG	0	4	0
Bow Street Brook	u/s Bow Street STW	JG	2	1	0
Cresswell Tributary	u/s Langdon STW	JG	0	4	0
Gwendraeth Estuary Tributary	d/s Llansaint STW	JG	0	3	0
Bran	d/s Llandovery Mart CSO	JG	0	3	0
Llynfi	d/s Caerau Colliery	JG	1	2	0
Myddfi	d/s Salem STW	SG	0	5	0
Loughor	d/s Garnswllt STW (2)	SG	0	5	0
Nant y Gwyddol	Derlwyn	SL	1	1	0
Neath	Site 6 - Canal Impact Survey	SL	0	0	0
Duar	Llanybydder d/s service reservoir	SL	0	1	0
Nant Pant-yr-Haidd	d/s Llanafan Council Works	SL	0	0	0
Melindwr Tributary	u/s Rhydcymerau New STW	SL	0	2	0
AUTUMN					
Taf	u/s Mansel Davies	JG	1	7	0
Westfield Pill	u/s Confluence with affected tributary	SL	0	2	1
Afon Gido Tributary	u/s Llanarth CSO	SL	0	1	0

Table 53. Statistics of the 1996 Primary Audit results for Welsh Region

Analyst/Group	n	Mean gains	Standard error	No.samples >2 gains	% samples >2 gains	Highest no. gains	Mean errors (I+g+o)	Standard error
Northern	20	1.55	0.28	5	25.00	4	1.90	0.31
353	1	0.00	n/a	0	0.00	0	1.00	n/a
355	4	1.75	0.75	1	25.00	4	2.00	1.00
356	1	3.00	n/a	1	100.00	3	3.00	n/a
372	14	1.50	0.31	3	21.43	3	1.86	0.35
South Eastern	20	1.65	0.36	4	20.00	6	1.85	0.42
CM	11	1.91	0.56	3	27.27	6	2.27	0.68
MC	9	1.33	0.44	1	11.11	4	1.33	0.44
South Western	20	2.45	0.41	8	40.00	7	2.85	0.44
JG	10	3.10	0.53	6	60.00	7	3.70	0.56
SG	2	5.00	0.00	2	100.00	5	5.00	0.00
SL	8	1.00	0.27	0	0.00	2	1.25	0.37
Welsh Region	60	1.88	0.21	17	28.33	7	2.20	0.23

Table 54. Net effects of the Primary Audit on BMWP score and number of scoring taxa for Welsh Region

Analyst/Group	n	Mean net effect on BMWP score	% of samples underestimated by score >13	Maximum underestimate of BMWP score	Mean net effect on no. of taxa	% of samples underestimated by >2 taxa	Maximum underestimate of no. of taxa
Northern	20	9.75	40.00	34	1.30	20.00	3
353	1	-3.00		-3	-1.00		-1
355	4	12.25	25.00	34	1.50	25.00	3
356	1	20.00	100.00	20	3.00	100.00	3
372	14	9.21	42.86	20	1.29	14.29	3
South Eastern	20	11.35	35.00	50	1.50	20.00	5
CM	11	14.73	54.55	50	1.64	27.27	5
MC	9	7.22	11.11	28	1.33	11.11	4
South Western	20	13.90	50.00	46	2.20	40.00	6
JG	10	15.80	60.00	46	2.70	60.00	6
SG	2	33.00	100.00	33	5.00	100.00	5
SL	8	6.75	25.00	18	0.88		2
Welsh Region	60	11.67	41.67	50	1.67	26.67	6

Table 55. The families missed by Welsh Region's primary analysts

Family	n	% of Welsh Region's missed taxa in Primary Audit
Hydrophilidae (incl. Hydraenidae)	6	5.88
Leuctridae	5	4.90
Hydropsychidae	5	4.90
Hydroptilidae	5	4.90
Psychomyiidae (incl. Ecnomidae)	4	3.92
Rhyacophilidae (incl. Glossosomatidae)	4	3.92
Goeridae	4	3.92
Leptoceridae	4	3.92
Simuliidae	4	3.92
Sphaeriidae	4	3.92
Polycentropodidae	4	3.92
Dytiscidae (incl. Noteridae)	4	3.92
Perlodidae	3	2.94
Baetidae	3	2.94
Caenidae	3	2.94
Chloroperlidae	3	2.94
Glossiphoniidae	3	2.94
Odontoceridae	3	2.94
Planariidae (incl. Dugesiidae)	2	1.96
Gyrinidae	2	1.96
Sericostomatidae	2	1.96
Lepidostomatidae	2	1.96
Scirtidae	2	1.96
Leptophlebiidae	2	1.96
Tipulidae	2	1.96
Heptageniidae	2	1.96
Lymnaeidae	2	1.96
Sialidae	1	0.98
Perlidae	1	0.98
Limnephilidae	1	0.98
Halplidae	1	0.98
Erpobdellidae	1	0.98
Ephemerellidae	1	0.98
Elmidae	1	0.98
Corixidae	1	0.98
Cordulegasteridae	1	0.98
Brachycentridae	1	0.98
Beraeidae	1	0.98
Ancylidae (incl. Acroloxidae)	1	0.98
Hydrobiidae (incl. Bithyniidae)	1	0.98
TOTAL	102	100.00

Table 56. The species missed by Welsh Region's primary analysts

Species	n	% of Welsh Region's missed species in Primary Audit
Hydraena gracilis Germar	5	4.72
Leuctra fusca (L.)	4	3.77
Glossiphonia complanata (L.)	3	2.83
Pisidium sp.	3	2.83
Odontocerum albicorne (Scopoli)	3	2.83
Chloroperla torrentium (Pictet)	3	2.83
Hydropsyche sp.	3	2.83
Isoperla grammatica (Poda)	2	1.89
Hydroptila sp.	2	1.89
Dicranota sp.	2	1.89
Ecdyonurus sp.	2	1.89
Paraleptophlebia submarginata (Stephens)	2	1.89
Oreodytes sanmarkii (Sahlberg)	2	1.89
Hydropsyche siltalai Dohler	2	1.89
Polycelis felina (Dalyell)	2	1.89
Caenis rivulorum Eaton	2	1.89
Ithytrichia sp.	2	1.89
Mystacides azurea (L.)	2	1.89
Lepidostoma hirtum (Fabricius)	2	1.89
Elodes sp.	2	1.89
Rhyacophila dorsalis (Curtis)	2	1.89
Baetis rhodani (Pictet)	2	1.89
Helophorus (Atracthelophorus) brevipalpis Bedel	2	1.89
Silo sp.	2	1.89
Psychomyia pusilla (Fabricius)	2	1.89
Lymnaea peregra (Muller)	2	1.89
Simulium (Simulium) ornatum group	2	1.89
Lype sp.	2	1.89
Sericostoma personatum (Spence)	2	1.89
Orectochilus villosus (Muller)	1	0.94
Oreodytes davisii (Curtis)	1	0.94
Oxyethira sp.	1	0.94
Perlodes microcephala (Pictet)	1	0.94
Plectrocnemia conspersa (Curtis)	1	0.94
Plectrocnemia sp.	1	0.94
Polycentropus flavomaculatus (Pictet)	1	0.94
Potamopyrgus jenkinsi (Smith)	1	0.94
Rhyacophila sp.	1	0.94
Sialis fuliginosa Pictet	1	0.94
Simulium (Eusimulium) aureum group	1	0.94
Simulium (Wilhelmia) equinum (L.)	1	0.94
Polycentropus sp.	1	0.94
Caenis luctuosa/macrura	1	0.94
Sphaeriidae indet	1	0.94
Agabus sp.	1	0.94
Ancylus fluviatilis Muller	1	0.94
Athripsodes bilineatus (L.)	1	0.94
Athripsodes cinereus (Curtis)	1	0.94
Athripsodes sp.	1	0.94

Table 56 (continued)

Species	n	% of Welsh Region's missed species in Primary Audit
Baetis scambus/fuscatus	1	0.94
Baetis sp.	1	0.94
Beraea maurus (Curtis)	1	0.94
Erpobdella octoculata (L.)	1	0.94
Brychius elevatus (Panzer)	1	0.94
Micronecta sp.	1	0.94
Colymbetinae indet	1	0.94
Cordulegaster boltonii (Donovan)	1	0.94
Dinocras cephalotes (Curtis)	1	0.94
Ecclisopteryx guttulata (Pictet)	1	0.94
Elmis aenea (Muller)	1	0.94
Ephemerella ignita (Poda)	1	0.94
Glossosoma sp.	1	0.94
Goera pilosa (Fabricius)	1	0.94
Goeridae indet	1	0.94
Gyrinus sp.	1	0.94
Leuctra inermis Kempny	1	0.94
Brachycentrus subnubilus Curtis	1	0.94
TOTAL	106	100.00

SUMMARY OF PRIMARY AUDIT FOR ENVIRONMENT AGENCY

Table 57. Statistics of the 1996 Primary Audit results for each Agency laboratory

Analyst/Group	n	Mean gains	Standard error	No.samples >2 gains	% samples >2 gains	Highest no. gains	Mean errors (1+g+o)	Standard error
Anglian Region	60	1.85	0.19	15	25.00	7	2.05	0.21
Central	20	2.10	0.37	7	35.00	7	2.50	0.41
Eastern	20	1.70	0.32	4	20.00	4	1.85	0.35
Northern	20	1.75	0.32	4	20.00	5	1.80	0.32
Midlands Region	80	2.20	0.20	30	37.50	9	2.50	0.23
Upper Severn	20	2.45	0.58	9	45.00	9	2.85	0.65
Lower Severn	20	1.60	0.28	4	20.00	4	1.75	0.31
Upper Trent	20	2.45	0.35	9	45.00	5	2.70	0.38
Lower Trent	20	2.30	0.33	8	40.00	5	2.70	0.46
North East Region	60	1.38	0.19	12	20.00	6	1.67	0.22
Dales	20	2.10	0.40	6	30.00	6	2.35	0.42
Northumbria	20	0.75	0.22	1	5.00	3	0.95	0.27
S.Yorkshire	20	1.30	0.27	5	25.00	3	1.70	0.38
North West Region	53	2.62	0.29	24	45.28	8	3.23	0.31
Central	13	1.85	0.41	4	30.77	4	2.38	0.49
Northern	20	2.65	0.51	9	45.00	8	3.25	0.50
Southern	20	3.10	0.50	11	55.00	7	3.75	0.57
South West Region	78	1.13	0.12	9	11.54	4	1.35	0.14
Cornwall	18	1.00	0.23	2	11.11	3	1.28	0.29
Devon	20	1.05	0.26	2	10.00	4	1.20	0.30
North Wessex	20	0.95	0.25	2	10.00	4	1.25	0.32
South Wessex	20	1.50	0.21	3	15.00	3	1.65	0.21
Southern Region	60	1.95	0.21	17	28.33	7	2.37	0.23
Eastern	30	2.50	0.31	13	43.33	7	2.97	0.36
Western	30	1.40	0.23	4	13.33	5	1.77	0.25
Thames Region	60	2.03	0.20	17	28.33	6	2.32	0.21
Fobney Mead	30	1.87	0.31	8	26.67	6	2.20	0.33
Waltham Cross	30	2.20	0.26	9	30.00	6	2.43	0.27
Welsh Region	60	1.88	0.21	17	28.33	7	2.20	0.23
Northern	20	1.55	0.28	5	25.00	4	1.90	0.31
South Eastern	20	1.65	0.36	4	20.00	6	1.85	0.42
South Western	20	2.45	0.41	8	40.00	7	2.85	0.44
Whole of Agency	511	1.86	0.07	142	27.79	9	2.18	0.08

Table 58. Net effects of the Primary Audit on BMWP score and number of scoring taxa for each Agency laboratory

Analyst/Group	n	Mean net effect on BMWP score	% of samples underestimated by score >13	Maximum underestimate of BMWP score	Mean net effect on no. of taxa	% of samples underestimated by >2 taxa	Maximum underestimate of no. of taxa
Anglian Region	60	9.35	25.00	46	1.80	21.67	7
Central	20	11.35	30.00	46	2.00	25.00	7
Eastern	20	8.55	30.00	29	1.65	20.00	4
Northern	20	8.15	15.00	26	1.75	20.00	5
Midlands Region	80	11.60	33.75	46	2.08	36.25	8
Upper Severn	20	12.70	35.00	46	2.25	40.00	8
Lower Severn	20	8.50	25.00	22	1.45	20.00	4
Upper Trent	20	13.60	30.00	37	2.45	45.00	5
Lower Trent	20	11.60	45.00	28	2.15	40.00	5
North East Region	60	8.37	23.33	44	1.23	16.67	6
Dales	20	14.35	40.00	44	2.00	25.00	6
Northumbria	20	5.20	20.00	21	0.60	5.00	3
S.Yorkshire	20	5.55	10.00	23	1.10	20.00	3
North West Region	53	11.45	37.74	50	2.21	39.62	8
Central	13	6.77	23.08	24	1.38	23.08	4
Northern	20	13.05	40.00	50	2.25	40.00	8
Southern	20	12.90	45.00	44	2.70	50.00	7
South West Region	78	5.78	11.54	28	0.96	8.97	4
Cornwall	18	4.50	11.11	25	0.78	5.56	3
Devon	20	5.65	15.00	23	0.90	10.00	4
North Wessex	20	5.20	5.00	28	0.80	5.00	3
South Wessex	20	7.65	15.00	20	1.35	15.00	3
Southern Region	60	10.08	33.33	43	1.65	21.67	6
Eastern	30	12.90	46.67	43	2.10	33.33	6
Western	30	7.27	20.00	24	1.20	10.00	5
Thames Region	60	9.58	28.33	36	1.82	23.33	6
Fobney Mead	30	8.47	23.33	36	1.67	26.67	6
Waltham Cross	30	10.70	33.33	35	1.97	20.00	6
Welsh Region	60	11.67	41.67	50	1.67	26.67	6
Northern	20	9.75	40.00	34	1.30	20.00	3
South Eastern	20	11.35	35.00	50	1.50	20.00	5
South Western	20	13.90	50.00	46	2.20	40.00	6
Whole of Agency	511	9.65	28.77	50	1.66	24.07	8

Table 59. The families missed by the Agency's primary analysts

Family	n	% of Agency's missed taxa in Primary Audit
Elmidae	47	5.41
Hydroptilidae	43	4.95
Hydrophilidae (incl. Hydraenidae)	40	4.61
Hydrobiidae (incl. Bithyniidae)	35	4.03
Simuliidae	35	4.03
Planariidae (incl. Dugesiidae)	27	3.11
Leptoceridae	26	3.00
Tipulidae	25	2.88
Psychomyiidae (incl. Ecnomidae)	24	2.76
Caenidae	23	2.65
Sphaeriidae	23	2.65
Valvatidae	23	2.65
Ancylidae (incl. Acroloxidae)	21	2.42
Baetidae	21	2.42
Lymnaeidae	20	2.30
Asellidae	20	2.30
Halplidae	20	2.30
Goeridae	19	2.19
Dendrocoelidae	19	2.19
Hydropsychidae	19	2.19
Planorbidae	19	2.19
Polycentropodidae	17	1.96
Rhyacophilidae (incl. Glossosomatidae)	16	1.84
Physidae	16	1.84
Leptophlebiidae	16	1.84
Dytiscidae (incl. Noteridae)	15	1.73
Glossiphoniidae	15	1.73
Limnephilidae	15	1.73
Erpobdellidae	13	1.50
Lepidostomatidae	12	1.38
Scirtidae	11	1.27
Coenagriidae	11	1.27
Leuctridae	10	1.15
Sericostomatidae	10	1.15
Nemouridae	10	1.15
Chironomidae	9	1.04
Chloroperlidae	9	1.04
Ephemerellidae	9	1.04
Heptageniidae	9	1.04
Gyrinidae	8	0.92
Perlodidae	8	0.92
Piscicolidae	6	0.69
Sialidae	6	0.69
Brachycentridae	6	0.69
Oligochaeta	5	0.58
Taeniopterygidae	5	0.58
Odontoceridae	5	0.58
Calopterygidae	5	0.58
Hydrometridae	4	0.46
Corixidae	4	0.46

Table 59 (continued)

Family	n	% of Agency's missed taxa in Primary Audit
Beraeidae	4	0.46
Corophiidae	3	0.35
Molannidae	3	0.35
Ephemeraidae	3	0.35
Gammaridae (incl. Crangonyctidae)	3	0.35
Aphelocheiridae	2	0.23
Unionidae	2	0.23
Notonectidae	2	0.23
Philopotamidae	2	0.23
Dryopidae	2	0.23
Neritidae	1	0.12
Gerridae	1	0.12
Perlidae	1	0.12
Phryganeidae	1	0.12
Hirudinidae	1	0.12
Cordulegasteridae	1	0.12
Gomphidae	1	0.12
Nepidae	1	0.12
TOTAL	868	100.00

Table 60. The species missed by the Agency's primary analysts

Species	n	% of EA's missed taxa in Primary Audit
Potamopyrgus jenkinsi (Smith)	34	3.72
Hydroptila sp.	32	3.50
Elmis aenea (Muller)	31	3.39
Simulium (Simulium) ornatum group	22	2.41
Ancylus fluviatilis Muller	20	2.19
Dendrocoelum lacteum (Muller)	19	2.08
Hydraena gracilis Germar	19	2.08
Pisidium sp.	18	1.97
Asellus aquaticus (L.)	16	1.75
Haliphus sp.	15	1.64
Valvata piscinalis (Muller)	15	1.64
Oulimnius sp.	14	1.53
Tinodes waeneri (L.)	13	1.42
Polycelis nigra/tenuis	12	1.31
Lymnaea peregra (Muller)	11	1.20
Caenis rivulorum Eaton	11	1.20
Caenis luctuosa/macrura	11	1.20
Baetis rhodani (Pictet)	10	1.09
Lepidostoma hirtum (Fabricius)	10	1.09
Elodes sp.	10	1.09
Sericostoma personatum (Spence)	10	1.09
Mystacides azurea (L.)	9	0.98
Gyraulus albus (Muller)	9	0.98
Chloroperla torrentium (Pictet)	9	0.98
Valvata cristata Muller	9	0.98
Simulium (Eusimulium) aureum group	9	0.98
Dicranota sp.	9	0.98
Ephemerella ignita (Poda)	9	0.98
Physa fontinalis (L.)	8	0.88
Orthocladinae	8	0.88
Hydropsyche siltalai Dohler	8	0.88
Helobdella stagnalis (L.)	7	0.77
Hydropsyche sp.	7	0.77
Orectochilus villosus (Muller)	7	0.77
Polycelis felina (Dalyell)	7	0.77
Polycentropus flavomaculatus (Pictet)	7	0.77
Leuctra fusca (L.)	7	0.77
Pilaria (Pilaria) sp.	7	0.77
Piscicola geometra (L.)	6	0.66
Silo sp.	6	0.66
Erpobdella octoculata (L.)	6	0.66
Helophorus (Atracthelophorus) brevipalpis Bedel	6	0.66
Ischnura elegans (Van der Linden)	6	0.66
Lype sp.	6	0.66
Ithytrichia sp.	6	0.66
Habrophlebia fusca (Curtis)	6	0.66
Rhyacophila dorsalis (Curtis)	6	0.66
Brachycentrus subnubilus Curtis	6	0.66
Isoperla grammatica (Poda)	6	0.66
Glossiphonia complanata (L.)	6	0.66

Table 60 continued

Species	n	% of EA's missed taxa in Primary Audit
Erpobdellidae indet	5	0.55
Agapetus sp.	5	0.55
Oxyethira sp.	5	0.55
Lymnaea sp.	5	0.55
Paraleptophlebia submarginata (Stephens)	5	0.55
Odontocerum albicorne (Scopoli)	5	0.55
Silo pallipes (Fabricius)	5	0.55
Limnephilidae indet	5	0.55
Physa acuta/heterostrophia	5	0.55
Ecdyonurus sp.	5	0.55
Armiger crista (L.)	5	0.55
Tipula (Yamatotipula) montium group	5	0.55
Limnius volckmari (Panzer)	5	0.55
Coenagriidae indet	5	0.55
Goera pilosa (Fabricius)	5	0.55
Baetis vernus Curtis	4	0.44
Nemoura avicularis Morton	4	0.44
Oreodytes sanmarkii (Sahlberg)	4	0.44
Oulimnius tuberculatus (Muller)	4	0.44
Tubificidae	4	0.44
Athripsodes sp.	4	0.44
Dugesia tigrina (Girard)	4	0.44
Psychomyia pusilla (Fabricius)	4	0.44
Athripsodes bilineatus (L.)	4	0.44
Athripsodes aterrimus (Stephens)	4	0.44
Sphaeriidae indet	4	0.44
Asellus meridianus Racovitza	4	0.44
Anisus vortex (L.)	4	0.44
Ephemera sp.	3	0.33
Limnephilus sp.	3	0.33
Hydraena riparia Kugelann	3	0.33
Sialis lutaria (L.)	3	0.33
Calopteryx splendens (Harris)	3	0.33
Leuctra inermis Kempny	3	0.33
Physa sp.	3	0.33
Simulium (Boophthora) erythrocephalum (deGeer)	3	0.33
Agraylea multipunctata Curtis	3	0.33
Taeniopteryx nebulosa (L.)	3	0.33
Hydropsyche angustipennis (Curtis)	3	0.33
Gammarus pulex (L.)	3	0.33
Plectrocnemia sp.	3	0.33
Athripsodes cinereus (Curtis)	3	0.33
Sialis fuliginosa Pictet	3	0.33
Plectrocnemia conspersa (Curtis)	3	0.33
Heptagenia sulphurea (Muller)	3	0.33
Molanna angustata Curtis	3	0.33
Hydrometra sp.	3	0.33
Cloeon dipterum (L.)	3	0.33
Chironomini	3	0.33
Glossosoma sp.	3	0.33

Table 60 continued

Species	n	% of EA's missed taxa in Primary Audit
Calopteryx sp.	2	0.22
Goeridae indet	2	0.22
Glossiphonia heteroclita (L.)	2	0.22
Halesus digitatus/radiatus	2	0.22
Dugesia lugubris/polychroa	2	0.22
Haliphus fluviatilis Aube	2	0.22
Dryops sp.	2	0.22
Corophium curvispinum Sars	2	0.22
Crunoecia irrorata (Curtis)	2	0.22
Protonemura meyeri (Pictet)	2	0.22
Nemurella picteti Klapalek	2	0.22
Notonecta sp.	2	0.22
Paraleptophlebia sp.	2	0.22
Planariidae indet	2	0.22
Platambus maculatus (L.)	2	0.22
Baetis scambus group	2	0.22
Aphelocheirus aestivalis (Fabricius)	2	0.22
Perlodes microcephala (Pictet)	2	0.22
Rhyacophila sp.	2	0.22
Sigara (Sigara) dorsalis (Leach)	2	0.22
Simulium (Nevermannia) angustitarse group	2	0.22
Agabus sp./Ilybius sp.	2	0.22
Tanypodinae	2	0.22
Tanytarsini	2	0.22
Adicella reducta (Mclachlan)	2	0.22
Polycentropus sp.	2	0.22
Lumbriculidae	2	0.22
Lymnaea truncatula (Muller)	2	0.22
Beraea maurus (Curtis)	2	0.22
Bathyomphalus contortus (L.)	2	0.22
Leptophlebiidae indet	2	0.22
Beraeodes minutus (L.)	2	0.22
Brachyptera risi (Morton)	2	0.22
Ilybius sp.	2	0.22
Caenis luctuosa group	1	0.11
Amphinemura sulcicollis (Stephens)	1	0.11
Anabolia nervosa (Curtis)	1	0.11
Caenis horaria (L.)	1	0.11
Dina lineata (Muller)	1	0.11
Athripsodes albifrons (L.)	1	0.11
Anacaena globulus (Paykull)	1	0.11
Bithynia tentaculata (L.)	1	0.11
Agabus sp.	1	0.11
Dicranota (Dicranota) sp.	1	0.11
Adicella/Triaenodes group	1	0.11
Anacaena bipustulata (Marshall)	1	0.11
Baetis sp.	1	0.11
Colymbetinae indet	1	0.11
Cordulegaster boltonii (Donovan)	1	0.11
Chloroperla tripunctata (Scopoli)	1	0.11

Table 60 continued

Species	n	% of EA's missed taxa in Primary Audit
Baetis buceratus Eaton	1	0.11
Anodonta sp.	1	0.11
Austrolimnophila sp.	1	0.11
Antocha vitripennis (Meigen)	1	0.11
Corophium multisetosum Stock	1	0.11
Brychius elevatus (Panzer)	1	0.11
Baetis scambus/fuscatus	1	0.11
Cyrrhus flavidus Mclachlan	1	0.11
Cercyon sp.	1	0.11
Cyrrhus trimaculatus (Curtis)	1	0.11
Ceraclea sp.	1	0.11
Dinocras cephalotes (Curtis)	1	0.11
Oulimnius major (Rey)	1	0.11
Potamonectes depressus/elegans	1	0.11
Drusus annulatus (Stephens)	1	0.11
Pilaria sp.	1	0.11
Pilaria (Neolimnomyia) sp.	1	0.11
Limnophila (Eloeophila) sp.	1	0.11
Philopotamus montanus (Donovan)	1	0.11
Potamonectes sp.	1	0.11
Oreodytes davisii (Curtis)	1	0.11
Nepa cinerea L.	1	0.11
Nemoura sp.	1	0.11
Mystacides nigra/longicornis	1	0.11
Micronecta sp.	1	0.11
Hydrocyphon deflexicollis (Muller)	1	0.11
Lymnaea palustris (Muller)	1	0.11
Phryganeidae indet	1	0.11
Simulium (Simulium) reptans (L.)	1	0.11
Trocheta sp.	1	0.11
Tinodes waeneri (L.), Lype sp.	1	0.11
Theodoxus fluviatilis (L.)	1	0.11
Sphaerium sp.	1	0.11
Planorbidae indet	1	0.11
Simulium (Wilhelmia) equinum (L.)	1	0.11
Prodiamesinae	1	0.11
Simulium (Nevermannia) cryophilum group	1	0.11
Silo nigricornis (Pictet)	1	0.11
Sigara (Subsigara) falleni (Fieber)	1	0.11
Riolus subviolaceus (Muller)	1	0.11
Rhithrogena sp.	1	0.11
Pseudanodonta complanata (Rossmassler)	1	0.11
Protonemura sp.	1	0.11
Simulium (Wilhelmia) sp.	1	0.11
Haemopsis sanguisuga (L.)	1	0.11
Helophorus flavipes/obscurus	1	0.11
Lymnaea stagnalis (L.)	1	0.11
Helophorus (Helophorus) minutus Fabricius	1	0.11
Helophorus (Helophorus) flavipes/obscurus	1	0.11
Limnephilus extricatus Mclachlan	1	0.11

Table 60 continued

Species	n	% of EA's missed taxa in Primary Audit
Haliplidae indet	1	0.11
Helophorus sp.	1	0.11
Gyrinus sp.	1	0.11
Gomphus vulgatissimus (L.)	1	0.11
Glossiphoniidae indet	1	0.11
Gerris (Gerris) lacustris (L.)	1	0.11
Erioptera sp.	1	0.11
Ecclisopteryx guttulata (Pictet)	1	0.11
Drusus annulatus/Ecclisopteryx guttulata	1	0.11
Haliphus lineatocollis (Marsham)	1	0.11
Hydrophilidae indet	1	0.11
Limnephilidae	1	0.11
Limnebius truncatellus (Thunberg)	1	0.11
Leptophlebia marginata (L.)	1	0.11
Laccobius sp.	1	0.11
Helophorus (Meghelophorus) grandis Illiger	1	0.11
Hydroporus tessellatus Drapiez	1	0.11
Heptagenia lateralis (Curtis)	1	0.11
Wormaldia occipitalis (Pictet)	1	0.11
Hydrometra stagnorum (L.)	1	0.11
Acroloxus lacustris (L.)	1	0.11
Hydrobius fuscipes (L.)	1	0.11
Hydraena riparia	1	0.11
Hippeutis complanatus (L.)	1	0.11
Heptagenia lateralis (Curtis)	1	0.11
Hydropsyche contubernalis McLachlan	1	0.11
TOTAL	914	100.00

MISSED TAXA FOR ALL SAMPLES IN 1996 AUDIT

Table 61 Missed families for all samples in the 1996 audit

Family	n	% of missed taxa in 1996 audit
Hydroptilidae	78	5.41
Elmidae	74	5.13
Hydrophilidae (incl. Hydraenidae)	73	5.06
Hydrobiidae (incl. Bithyniidae)	59	4.09
Simuliidae	57	3.95
Planariidae (incl. Dugesiiidae)	49	3.40
Psychomyiidae (incl. Ecnomidae)	49	3.40
Caenidae	43	2.98
Tipulidae	41	2.84
Leptoceridae	41	2.84
Sphaeriidae	40	2.77
Haliplidae	36	2.50
Lymnaeidae	36	2.50
Planorbidae	35	2.43
Valvatidae	32	2.22
Goeridae	32	2.22
Hydropsychidae	31	2.15
Polycentropodidae	30	2.08
Ancylidae (incl. Acrolloxidae)	29	2.01
Glossiphoniidae	29	2.01
Asellidae	29	2.01
Rhyacophilidae (incl. Glossosomatidae)	28	1.94
Physidae	26	1.80
Lepidostomatidae	26	1.80
Limnephilidae	26	1.80
Baetidae	26	1.80
Dytiscidae (incl. Noteridae)	25	1.73
Dendrocoelidae	24	1.66
Sericostomatidae	24	1.66
Nemouridae	22	1.53
Leptophlebiidae	22	1.53
Erpobdellidae	18	1.25
Scirtidae	17	1.18
Coenagriidae	16	1.11
Chloroperlidae	16	1.11
Leuctridae	16	1.11
Ephemerellidae	15	1.04
Heptageniidae	14	0.97
Gyrinidae	14	0.97
Chironomidae	14	0.97
Brachycentridae	11	0.76
Odontoceridae	10	0.69
Perlodidae	10	0.69
Oligochaeta	10	0.69
Taeniopterygidae	10	0.69
Piscicolidae	9	0.62
Sialidae	8	0.55
Calopterygidae	6	0.42
Beraeidae	5	0.35
Corophiidae	5	0.35

Table 61 continued

Family	n	% of missed taxa in 1996 audit
Corixidae	5	0.35
Hydrometridae	4	0.28
Ephemeridae	4	0.28
Gammaridae (incl. Crangonyctidae)	4	0.28
Notonectidae	3	0.21
Molannidae	3	0.21
Dryopidae	3	0.21
Hirudinidae	2	0.14
Phryganeidae	2	0.14
Aphelocheiridae	2	0.14
Perlidae	2	0.14
Unionidae	2	0.14
Philopotamidae	2	0.14
Nepidae	2	0.14
Capniidae	1	0.07
Cordulegasteridae	1	0.07
Gerridae	1	0.07
Gomphidae	1	0.07
Neritidae	1	0.07
Siphonuridae	1	0.07
TOTAL	1442	100.00

Table 62 Missed species for all samples in the 1996 audit

Species	n	% of missed species in 1996 audit
Potamopyrgus jenkinsi (Smith)	58	3.84
Hydroptila sp.	58	3.84
Elmis aenea (Muller)	51	3.38
Hydraena gracilis Germar	38	2.52
Simulium (Simulium) ornatum group	33	2.19
Pisidium sp.	32	2.12
Ancylus fluviatilis Muller	28	1.86
Dendrocoelum lacteum (Muller)	24	1.59
Sericostoma personatum (Spence)	24	1.59
Haliphus sp.	24	1.59
Tinodes waeneri (L.)	24	1.59
Caenis rivulorum Eaton	24	1.59
Asellus aquaticus (L.)	23	1.52
Lepidostoma hirtum (Fabricius)	22	1.46
Valvata piscinalis (Muller)	21	1.39
Lymnaea peregra (Muller)	19	1.26
Polycelis nigra/tenuis	19	1.26
Oulimnius sp.	18	1.19
Caenis luctuosa/macrura	17	1.13
Gyraulus albus (Muller)	17	1.13
Dicranota sp.	16	1.06
Elodes sp.	16	1.06
Chloroperla torrentium (Pictet)	16	1.06
Ephemerella ignita (Poda)	15	0.99
Helobdella stagnalis (L.)	15	0.99
Valvata cristata Muller	14	0.93
Psychomyia pusilla (Fabricius)	14	0.93
Orectochilus villosus (Muller)	13	0.86
Rhyacophila dorsalis (Curtis)	13	0.86
Mystacides azurea (L.)	13	0.86
Hydropsyche siltalai Dohler	13	0.86
Baetis rhodani (Pictet)	13	0.86
Helophorus (Atracthelophorus) brevipalpis Bedel	13	0.86
Orthocladiinae	12	0.80
Leuctra fusca (L.)	12	0.80
Polycentropus flavomaculatus (Pictet)	12	0.80
Physa fontinalis (L.)	12	0.80
Simulium (Eusimulium) aureum group	12	0.80
Hydropsyche sp.	12	0.80
Lymnaea sp.	11	0.73
Polycelis felina (Dalyell)	11	0.73
Brachycentrus subnubilus Curtis	11	0.73
Silo pallipes (Fabricius)	11	0.73
Ithytrichia sp.	11	0.73
Ecdyonurus sp.	10	0.66
Ischnura elegans (Van der Linden)	10	0.66
Glossiphonia complanata (L.)	10	0.66
Odontocerum albicorne (Scopoli)	10	0.66
Pilaria (Pilaria) sp.	10	0.66
Habrophlebia fusca (Curtis)	10	0.66

Table 62 continued

Species	n	% of missed species in 1996 audit
Silo sp.	10	0.66
Piscicola geometra (L.)	9	0.60
Agapetus sp.	9	0.60
Oreodytes sanmarkii (Sahlberg)	9	0.60
Lype sp.	8	0.53
Athripsodes bilineatus (L.)	8	0.53
Limnephilidae indet	8	0.53
Oxyethira sp.	8	0.53
Armiger crista (L.)	8	0.53
Erpobdellidae indet	8	0.53
Oulimnius tuberculatus (Muller)	7	0.46
Paraleptophlebia submarginata (Stephens)	7	0.46
Physa sp.	7	0.46
Physa acuta/heterostrophia	7	0.46
Erpobdella octoculata (L.)	7	0.46
Goera pilosa (Fabricius)	7	0.46
Limnius volckmari (Panzer)	7	0.46
Sphaeriidae indet	7	0.46
Nemoura avicularis Morton	6	0.40
Asellus meridianus Racovitza	6	0.40
Isoperla grammatica (Poda)	6	0.40
Coenagriidae indet	6	0.40
Dugesia tigrina (Girard)	6	0.40
Tubificidae	6	0.40
Plectrocnemia conspersa (Curtis)	6	0.40
Baetis vernus Curtis	5	0.33
Taeniopteryx nebulosa (L.)	5	0.33
Athripsodes sp.	5	0.33
Protonemura meyeri (Pictet)	5	0.33
Bathymphalus contortus (L.)	5	0.33
Tipula (Yamatotipula) montium group	5	0.33
Brachyptera risi (Morton)	5	0.33
Athripsodes aterrimus (Stephens)	5	0.33
Plectrocnemia sp.	5	0.33
Anisus vortex (L.)	5	0.33
Dugesia lugubris/polychroa	4	0.27
Planariidae indet	4	0.27
Sialis fuliginosa Pictet	4	0.27
Simulium (Boophthora) erythrocephalum (deGeer)	4	0.27
Ephemera sp.	4	0.27
Crunoecia irrorata (Curtis)	4	0.27
Haliphus lineatocollis (Marshall)	4	0.27
Hydraena riparia Kugelann	4	0.27
Glossosoma sp.	4	0.27
Leuctra inermis Kempny	4	0.27
Hydropsyche angustipennis (Curtis)	4	0.27
Perlodes microcephala (Pictet)	4	0.27
Nemurella picteti Klapalek	4	0.27
Tanytarsini	4	0.27
Glossiphonia heteroclita (L.)	4	0.27

Table 62 continued

Species	n	% of missed species in 1996 audit
<i>Haliplus fluviatilis</i> Aube	4	0.27
<i>Gammarus pulex</i> (L.)	4	0.27
<i>Agraylea multipunctata</i> Curtis	4	0.27
<i>Agabus</i> sp./ <i>Ilybius</i> sp.	4	0.27
<i>Adicella reducta</i> (Mclachlan)	3	0.20
<i>Halesus digitatus/radiatus</i>	3	0.20
<i>Simulium</i> (Nevermannia) <i>cryophilum</i> group	3	0.20
<i>Antocha vitripennis</i> (Meigen)	3	0.20
<i>Heptagenia sulphurea</i> (Muller)	3	0.20
<i>Hydrometra</i> sp.	3	0.20
<i>Simulium</i> (Nevermannia) <i>angustitarse</i> group	3	0.20
<i>Molanna angustata</i> Curtis	3	0.20
<i>Platambus maculatus</i> (L.)	3	0.20
<i>Beraea maurus</i> (Curtis)	3	0.20
<i>Calopteryx</i> sp.	3	0.20
<i>Polycentropus</i> sp.	3	0.20
<i>Calopteryx splendens</i> (Harris)	3	0.20
<i>Notonecta</i> sp.	3	0.20
Chironomini	3	0.20
<i>Limnebius truncatellus</i> (Thunberg)	3	0.20
<i>Corophium curvispinum</i> Sars	3	0.20
<i>Paraleptophlebia</i> sp.	3	0.20
<i>Protonemura</i> sp.	3	0.20
<i>Athripsodes cinereus</i> (Curtis)	3	0.20
<i>Dugesia polychroa/lugubris</i>	3	0.20
<i>Dryops</i> sp.	3	0.20
<i>Drusus annulatus</i> / <i>Ecclisopteryx guttulata</i>	3	0.20
<i>Cloeon dipterum</i> (L.)	3	0.20
<i>Rhyacophila</i> sp.	3	0.20
<i>Limnephilus</i> sp.	3	0.20
<i>Sialis lutaria</i> (L.)	3	0.20
<i>Ecclisopteryx guttulata</i> (Pictet)	2	0.13
<i>Haemopsis sanguisuga</i> (L.)	2	0.13
<i>Brychius elevatus</i> (Panzer)	2	0.13
<i>Adicella/Triaenodes</i> group	2	0.13
Goeridae indet	2	0.13
<i>Beraeodes minutus</i> (L.)	2	0.13
<i>Caenis horaria</i> (L.)	2	0.13
<i>Agabus</i> sp.	2	0.13
<i>Baetis scambus</i> group	2	0.13
<i>Anacaena globulus</i> (Paykull)	2	0.13
<i>Baetis buceratus</i> Eaton	2	0.13
<i>Aphelocheirus aestivalis</i> (Fabricius)	2	0.13
<i>Corophium multisetosum</i> Stock	2	0.13
<i>Austrolimnophila</i> sp.	2	0.13
Erioptera sp.	2	0.13
<i>Amphinemura sulcicollis</i> (Stephens)	2	0.13
<i>Cyrrus trimaculatus</i> (Curtis)	2	0.13
Enchytraeidae	2	0.13
<i>Anabolia nervosa</i> (Curtis)	2	0.13

Table 62 continued

Species	n	% of missed species in 1996 audit
Glossiphoniidae indet	2	0.13
Lymnaea stagnalis (L.)	2	0.13
Ilybius sp.	2	0.13
Laccobius sp.	2	0.13
Leptophlebiidae indet	2	0.13
Limnephilus extricatus McLachlan	2	0.13
Limnophila (Eloeophila) sp.	2	0.13
Silo nigricornis (Pictet)	2	0.13
Hydropsyche contubernalis McLachlan	2	0.13
Pilaria sp.	2	0.13
Lumbriculidae	2	0.13
Lymnaea truncatula (Muller)	2	0.13
Mystacides nigra/longicornis	2	0.13
Nemoura cambrica/erratica	2	0.13
Nemoura sp.	2	0.13
Nepa cinerea L.	2	0.13
Halplidae indet	2	0.13
Potamonectes sp.	2	0.13
Oulimnius major (Rey)	2	0.13
Phryganeidae indet	2	0.13
Sigara (Subsigara) falleni (Fieber)	2	0.13
Simulium argyreatum/variegatum	2	0.13
Sigara (Sigara) dorsalis (Leach)	2	0.13
Hydrophilidae indet	2	0.13
Helophorus flavipes/obscurus	2	0.13
Helophorus sp.	2	0.13
Tanypodinae	2	0.13
Tinodes waeneri (L.), Lype sp.	2	0.13
Hydraena riparia	2	0.13
Simulium (Simulium) reptans (L.)	2	0.13
Trocheta sp.	2	0.13
Hydrobius fuscipes (L.)	2	0.13
Helophorus (Helophorus) flavipes/obscurus	2	0.13
Polycentropus flavomaculatus/kingi	1	0.07
Bithynia tentaculata (L.)	1	0.07
Ameletus inopinatus Eaton	1	0.07
Sphaerium sp.	1	0.07
Baetis scambus/fuscatus	1	0.07
Potamophylax cingulatus/latipennis	1	0.07
Theodoxus fluviatilis (L.)	1	0.07
Prodiamesinae	1	0.07
Athripsodes commutatus (Rostock)	1	0.07
Baetis sp.	1	0.07
Tipula sp.	1	0.07
Potamonectes depressus/elegans	1	0.07
Polycelis sp.	1	0.07
Cercyon sp.	1	0.07
Anodonta sp.	1	0.07
Simulium (Wilhelmia) equinum (L.)	1	0.07
Anacaena limbata (Fabricius)	1	0.07

Table 62 continued

Species	n	% of missed species in 1996 audit
Simulium (Simulium) argyreatum Meigen	1	0.07
Simulium (Nevermannia) verum Macquart	1	0.07
Pseudanodonta complanata (Rossmassler)	1	0.07
Anacaena bipustulata (Marsham)	1	0.07
Prosimulium hirtipes/tomosvaryi	1	0.07
Simulium sp.	1	0.07
Athripsodes albifrons (L.)	1	0.07
Athripsodes albifrons/bilineatus	1	0.07
Sialis sp.	1	0.07
Riolus subviolaceus (Muller)	1	0.07
Rhithrogena sp.	1	0.07
Psychomyiidae indet	1	0.07
Simulium (Wilhelmia) sp.	1	0.07
Hippeutis complanatus (L.)	1	0.07
Lumbricidae	1	0.07
Capnia sp.	1	0.07
Leptophlebia marginata (L.)	1	0.07
Wormaldia occipitalis (Pictet)	1	0.07
Acroloxus lacustris (L.)	1	0.07
Hydrometra stagnorum (L.)	1	0.07
Planorbidae indet	1	0.07
Gerris (Gerris) lacustris (L.)	1	0.07
Drusus annulatus (Stephens)	1	0.07
Heptagenia lateralis (Curtis)	1	0.07
Heptagenia lateralis (Curtis)	1	0.07
Gomphus vulgatissimus (L.)	1	0.07
Helophorus (Meghelophorus) grandis Illiger	1	0.07
Gyraulus albus (Muller)	1	0.07
Gyrinus sp.	1	0.07
Helophorus (Meghelophorus) aequalis Thomson	1	0.07
Helophorus (Helophorus) minutus Fabricius	1	0.07
Halesus radiatus (Curtis)	1	0.07
Hydrocyphon deflexicollis (Muller)	1	0.07
Colymbetinae indet	1	0.07
Pilaria (Neolimnomyia) sp.	1	0.07
Caenis luctuosa group	1	0.07
Philopotamus montanus (Donovan)	1	0.07
Perla bipunctata Pictet	1	0.07
Oreodytes davisii (Curtis)	1	0.07
Hydroporus tessellatus Drapiez	1	0.07
Limnephilidae	1	0.07
Chloroperla tripunctata (Scopoli)	1	0.07
Dinocras cephalotes (Curtis)	1	0.07
Cordulegaster boltonii (Donovan)	1	0.07
Molophilus sp.	1	0.07
Micronecta sp.	1	0.07
Crenobia alpina/Phagocata vitta	1	0.07
Cyrnus flavidus Mclachlan	1	0.07
Lymnaea palustris/truncatula	1	0.07
Dicranota (Dicranota) sp.	1	0.07

Table 62 continued

Species	n	% of missed species in 1996 audit
<i>Lymnaea palustris</i> (Muller)	1	0.07
<i>Dina lineata</i> (Muller)	1	0.07
<i>Ceraclea</i> sp.	1	0.07
TOTAL	1509	100.00